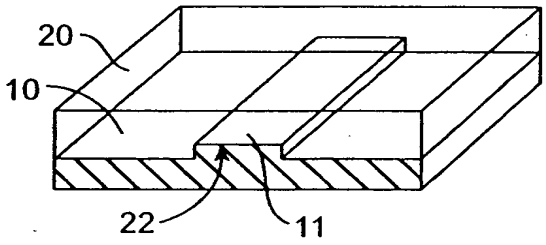


FIG. 1

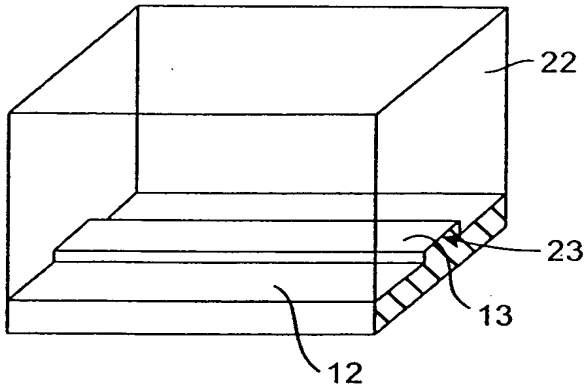


FIG. 2

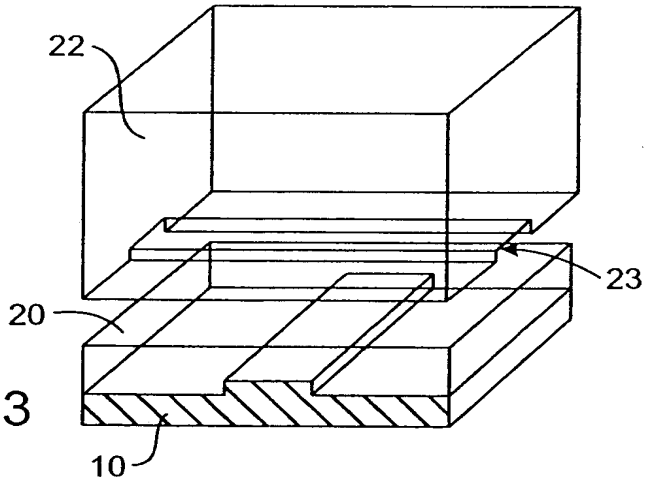


FIG. 3

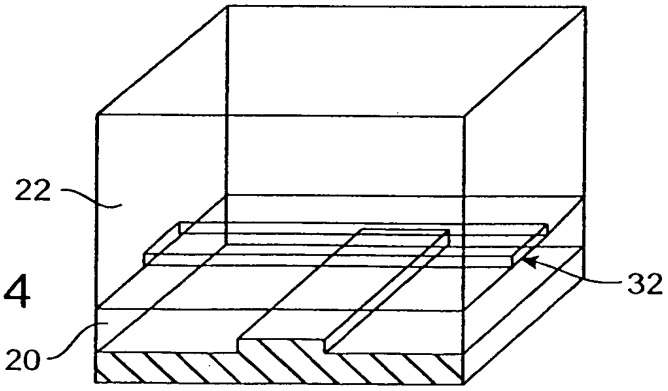


FIG. 4

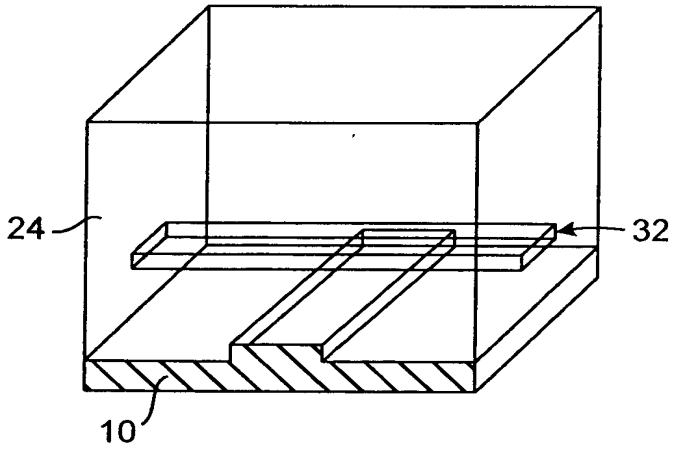


FIG. 5

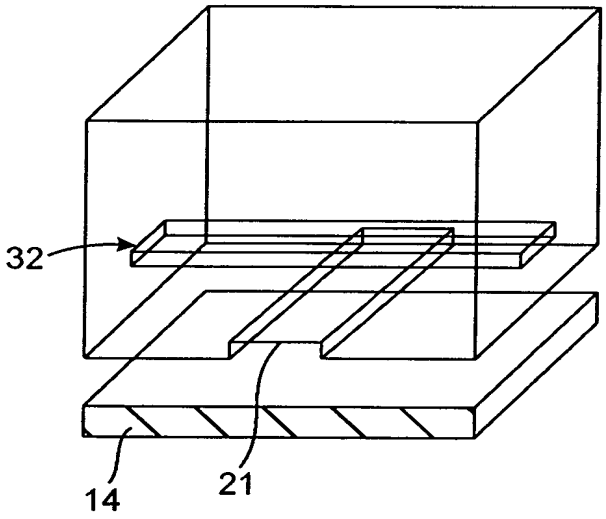


FIG. 6

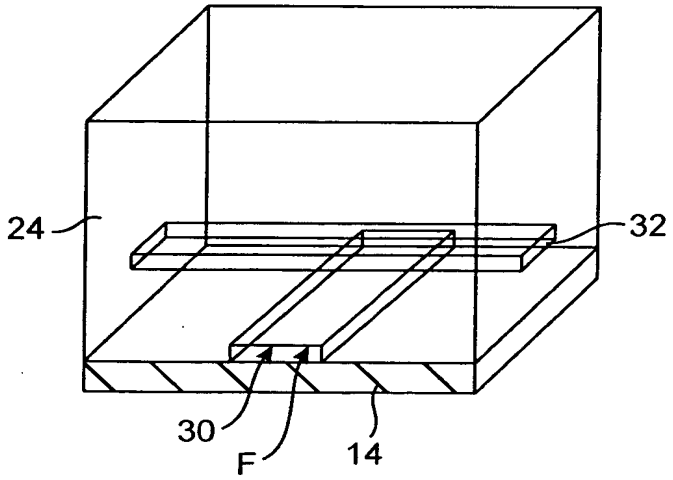


FIG. 7A

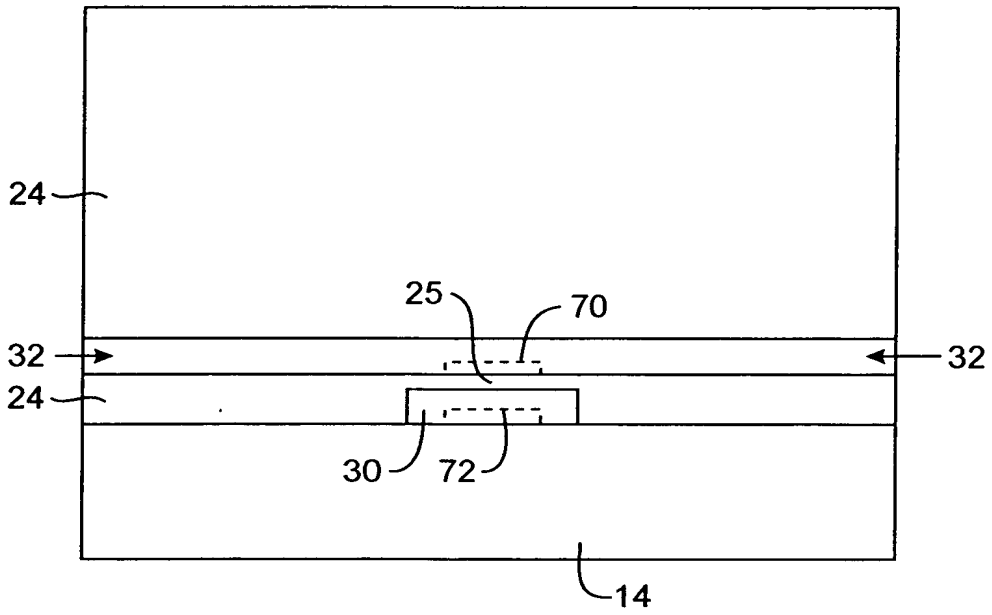


FIG. 7B

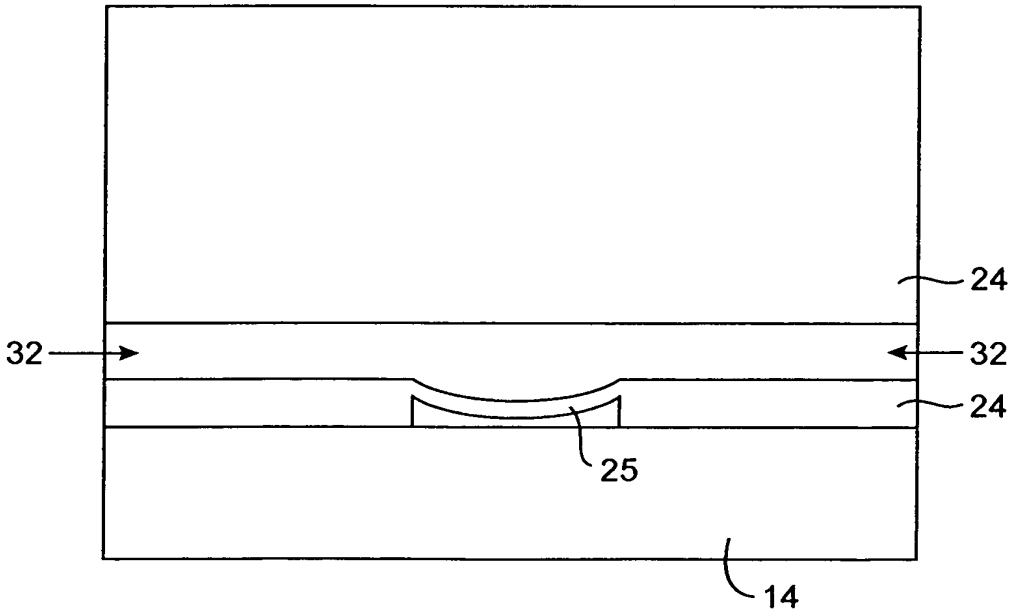


FIG. 7H

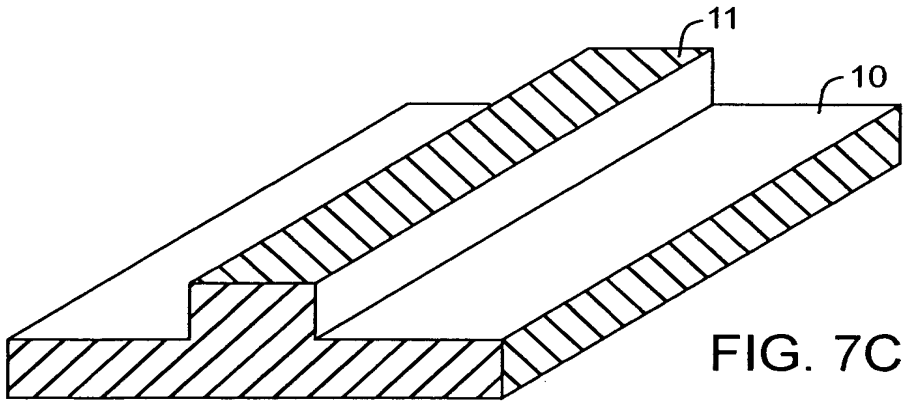


FIG. 7C

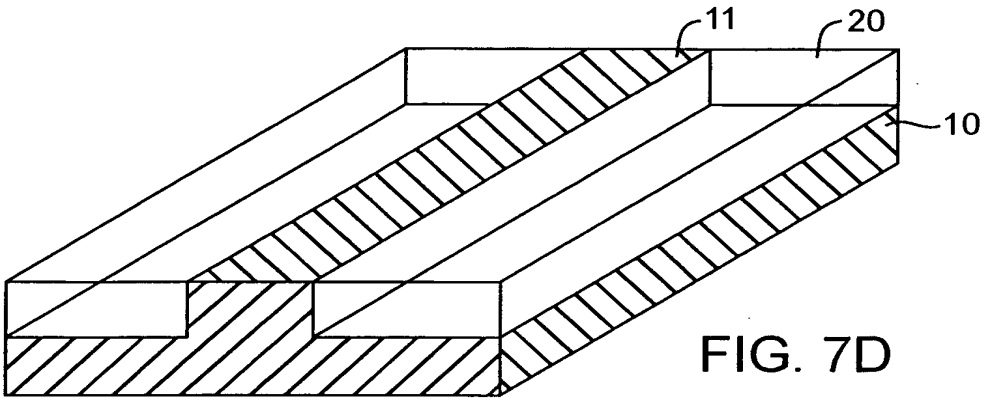


FIG. 7D

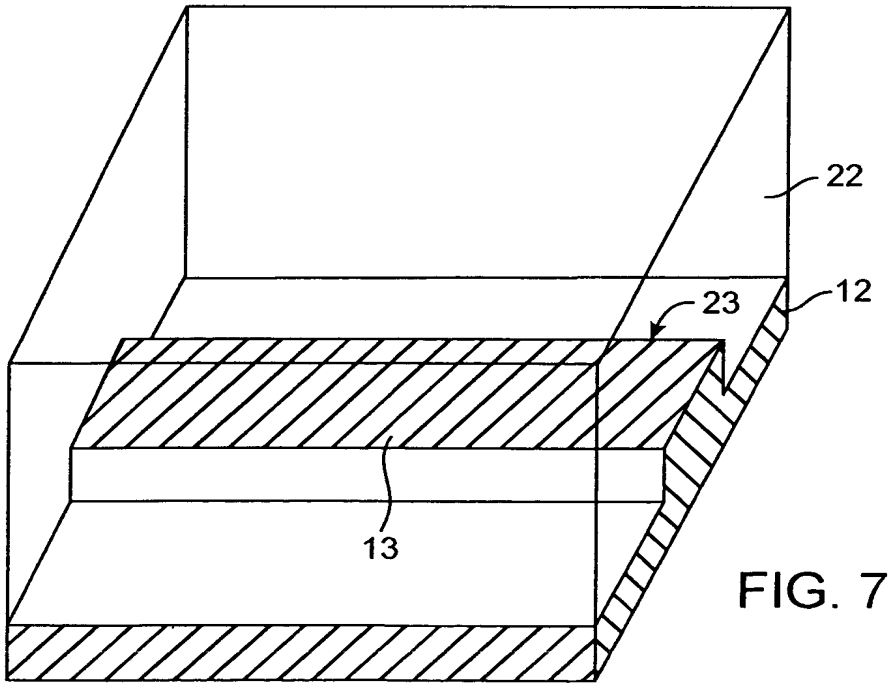


FIG. 7E

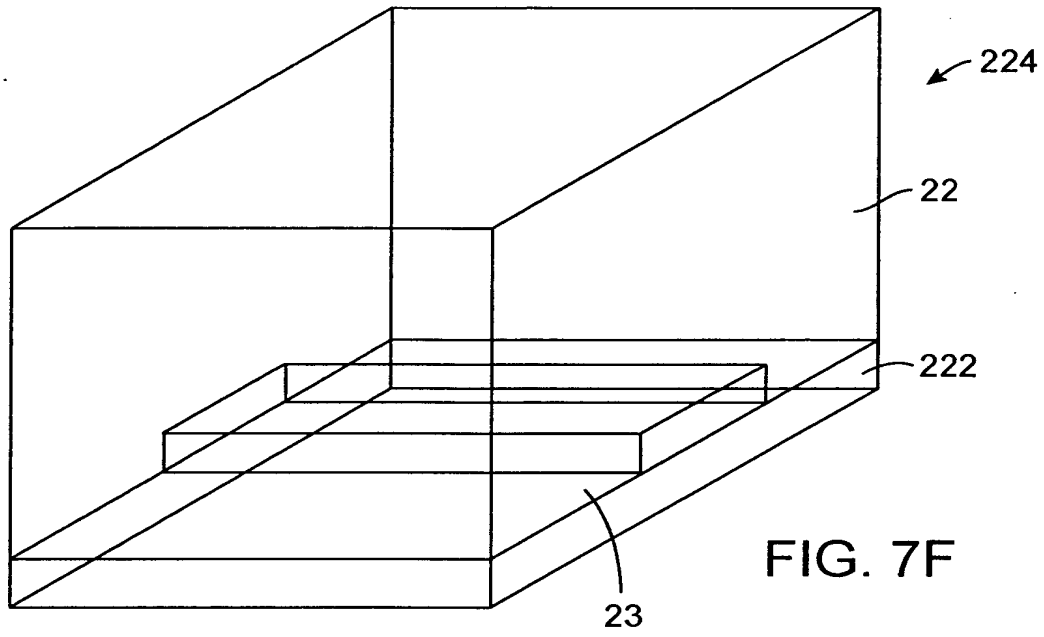


FIG. 7F

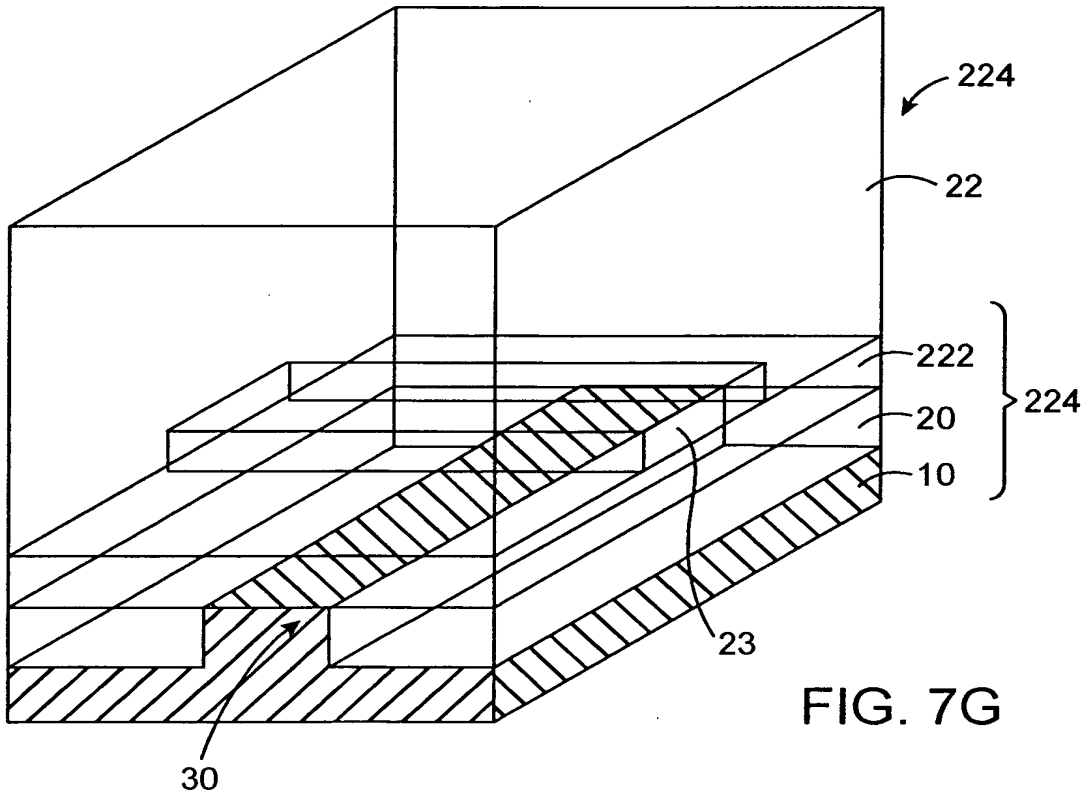


FIG. 7G

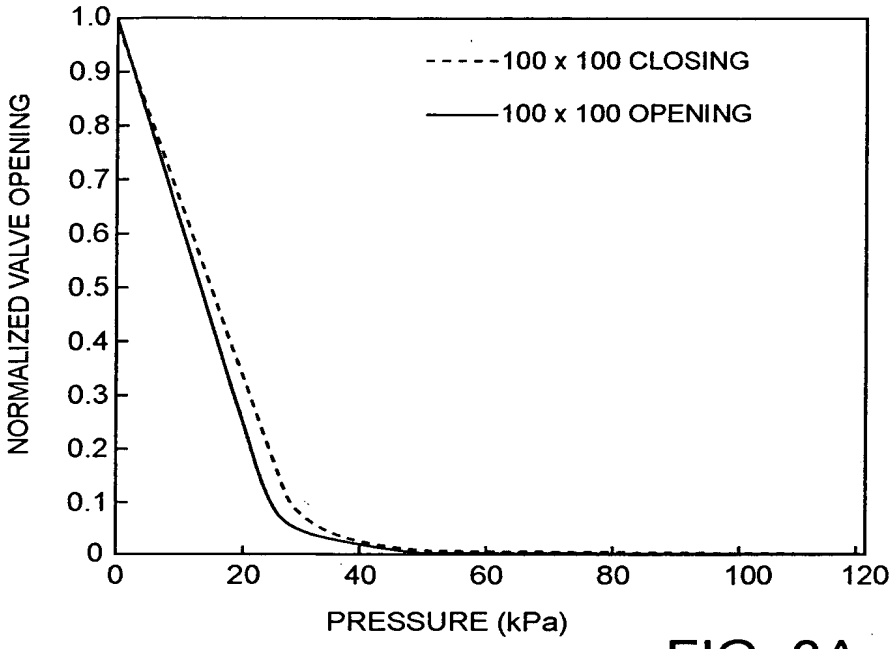

NORMALIZED VALVE OPENING
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
100
120
PRESSURE (kPa)
100 x 100 CLOSING
100 x 100 OPENING

FIG. 8A

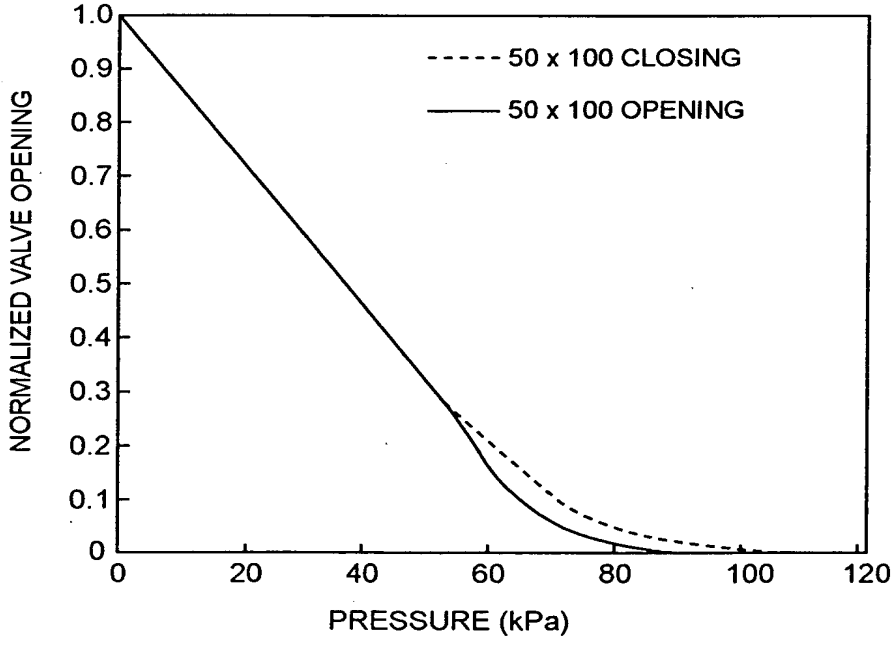

NORMALIZED VALVE OPENING
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
100
120
PRESSURE (kPa)
50 x 100 CLOSING
50 x 100 OPENING

FIG. 8B

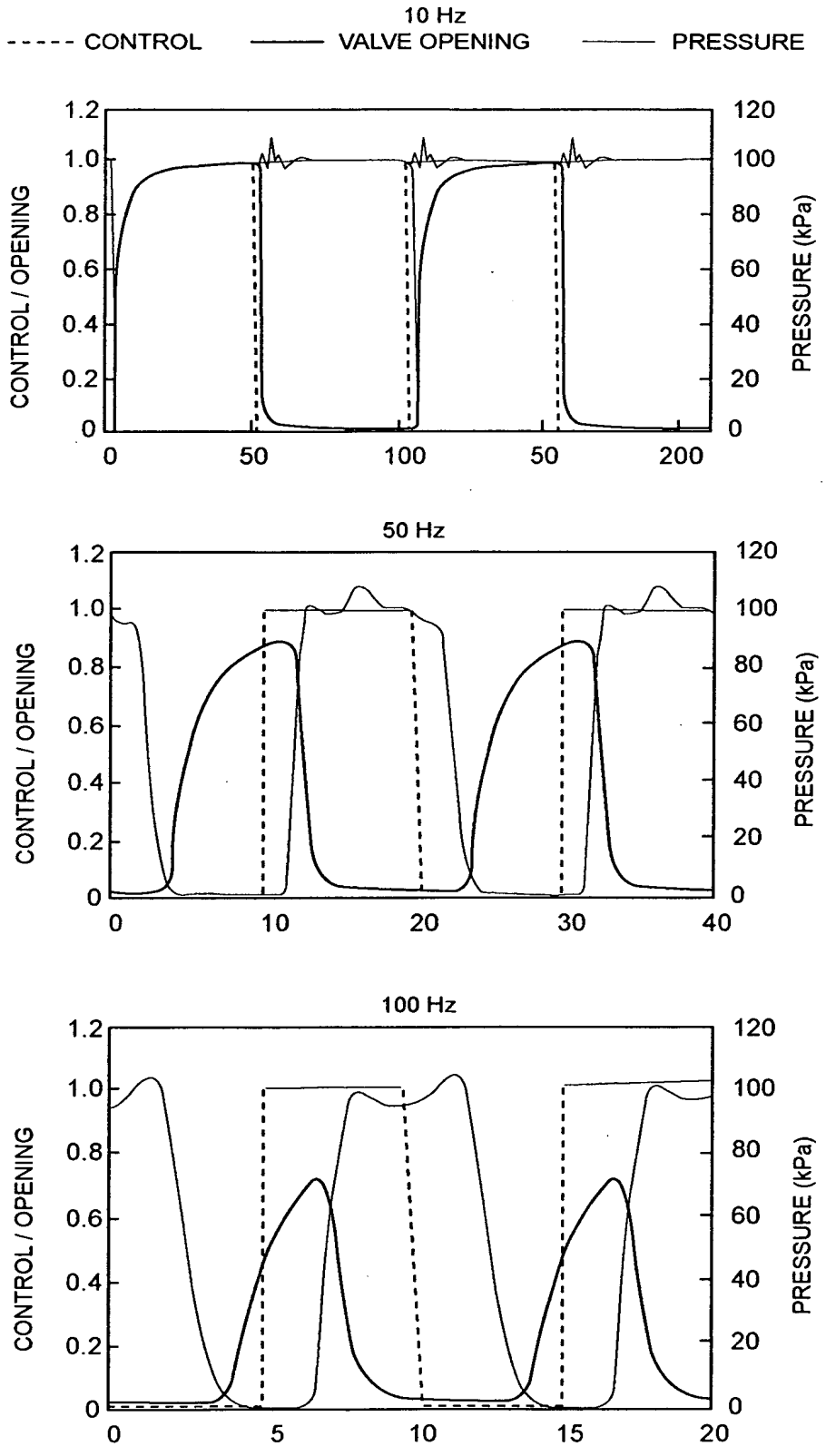

10 Hz
CONTROL
VALVE OPENING
PRESSURE
CONTROL / OPENING
PRESSURE (kPa)
50 Hz
100 Hz

FIG. 9

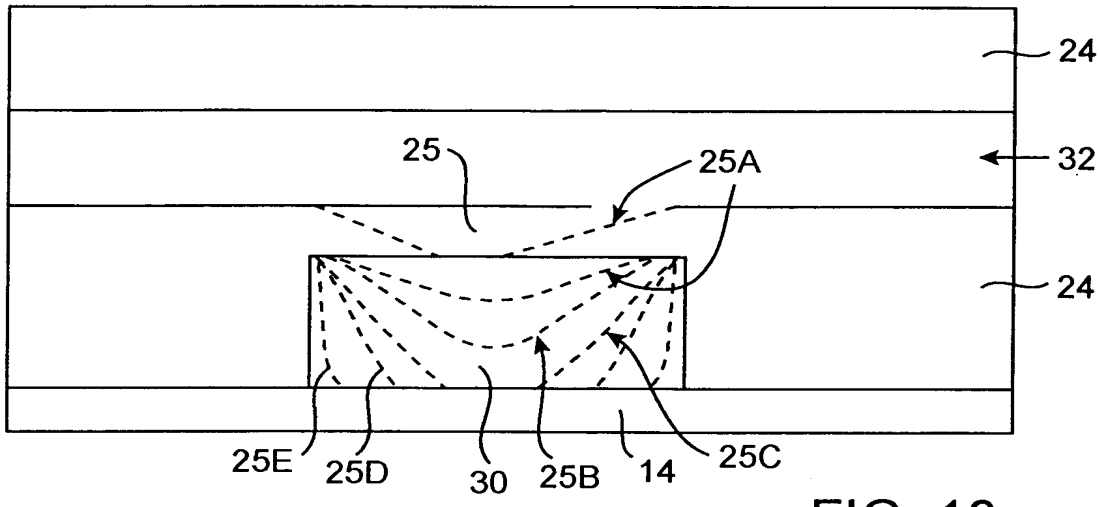

24
25
25A
32
24
25E
25D
30
25B
14
25C

FIG. 10

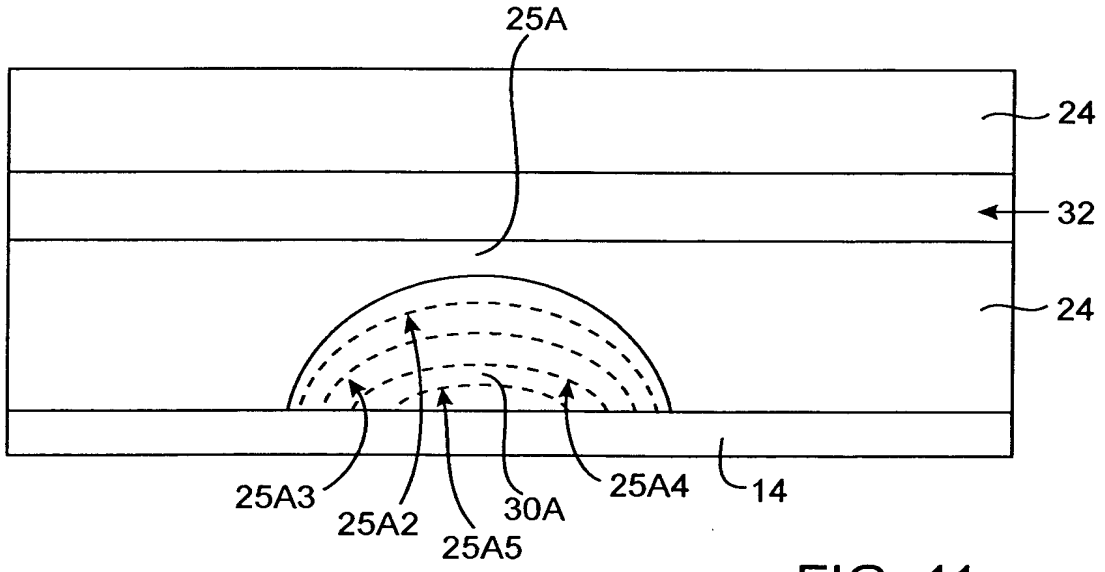

25A
24
32
24
25A3
25A2
25A5
30A
25A4
14

FIG. 11

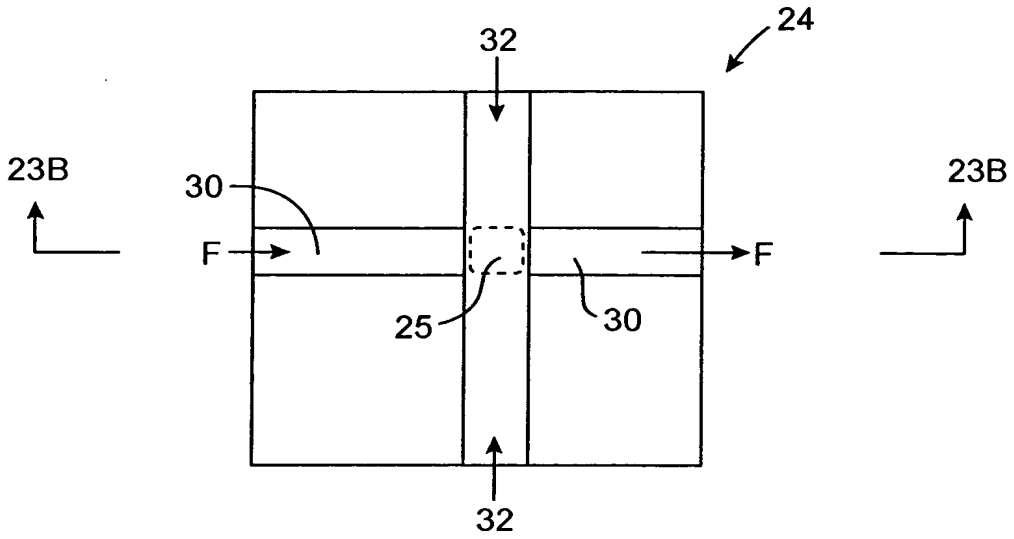


FIG. 12A

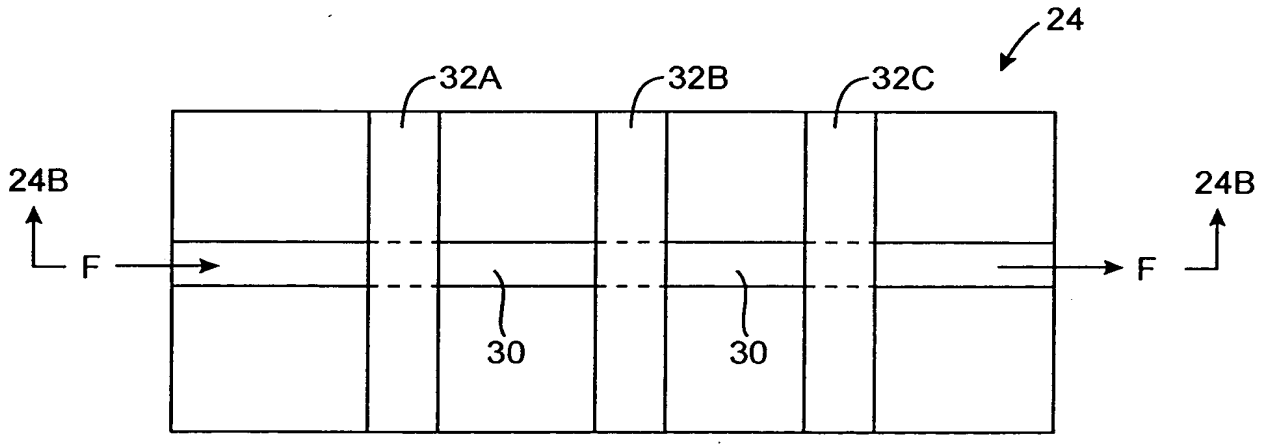


FIG. 13A

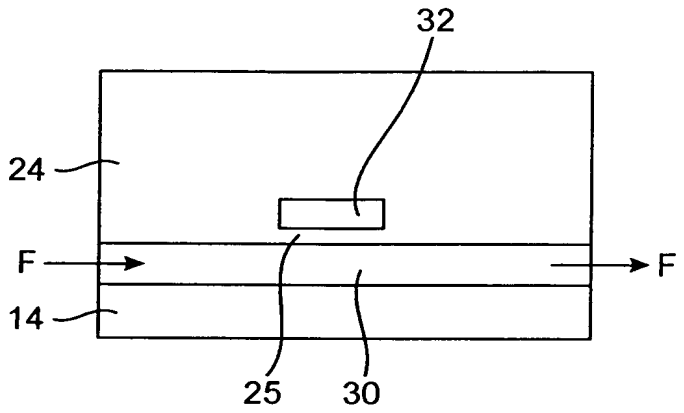


FIG. 12B

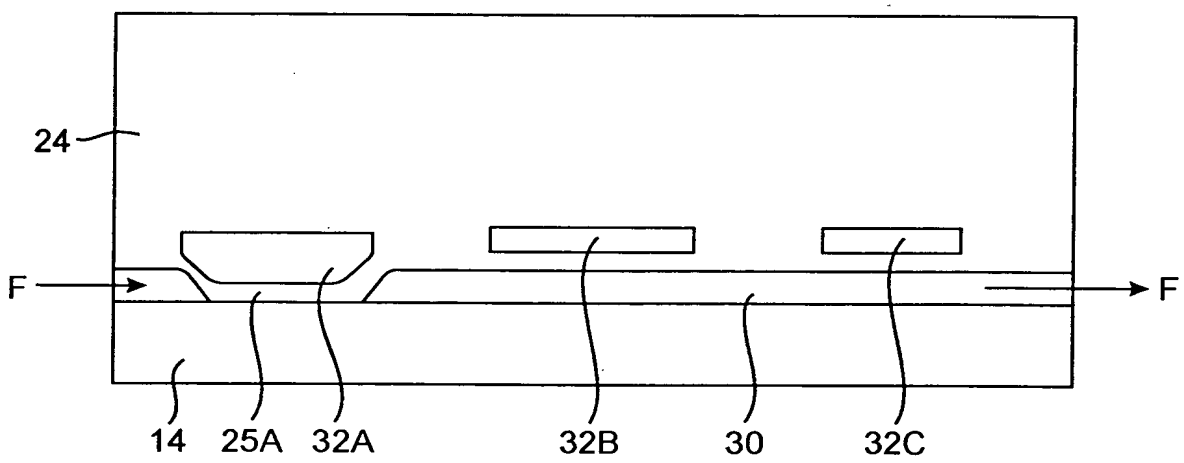


FIG. 13B

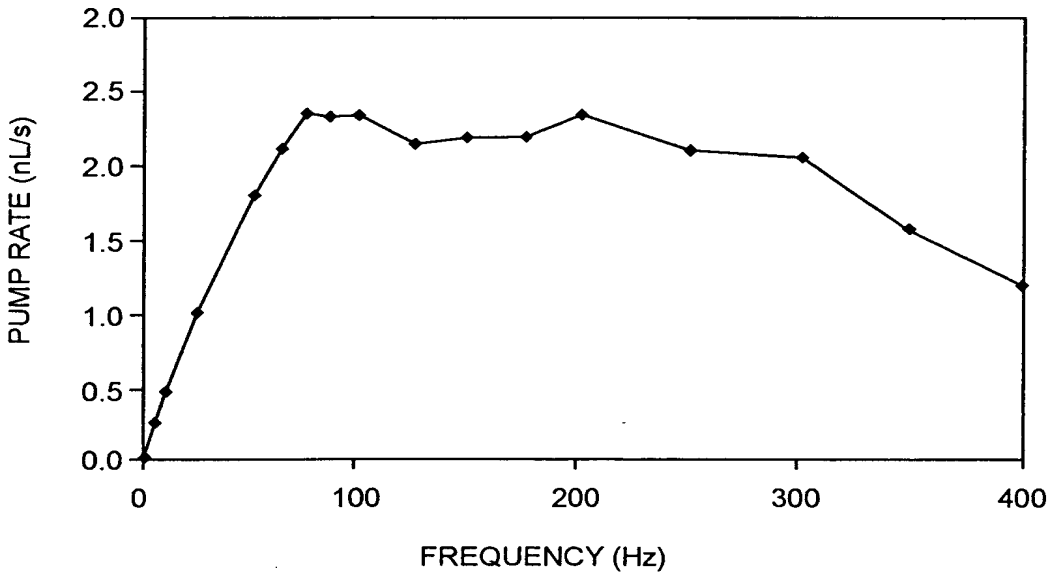


FIG. 14

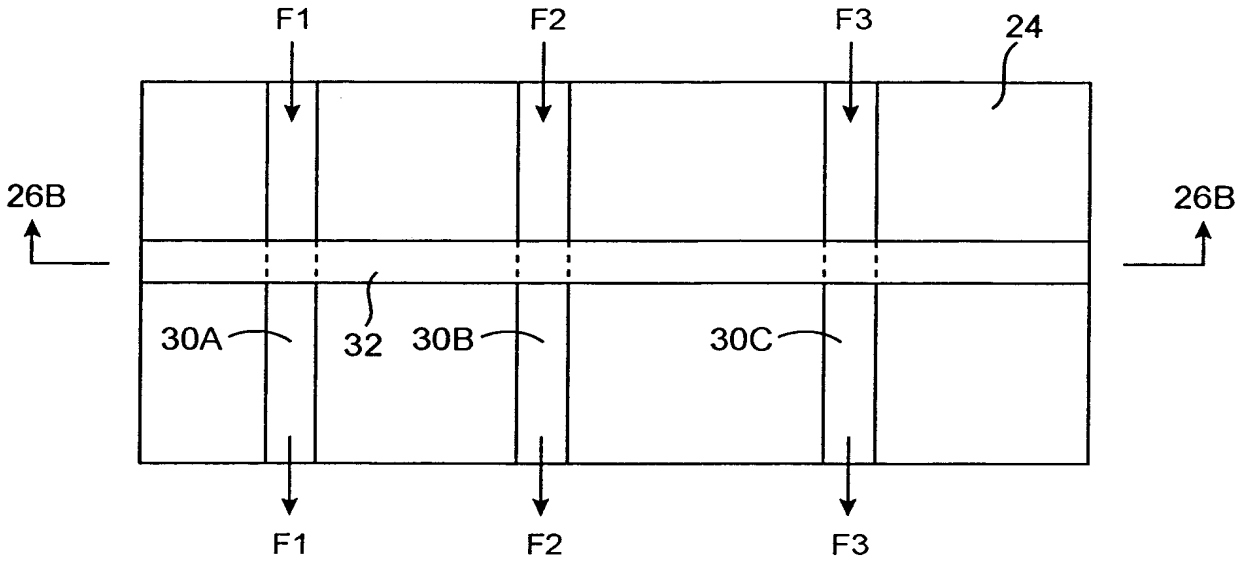


FIG. 15A

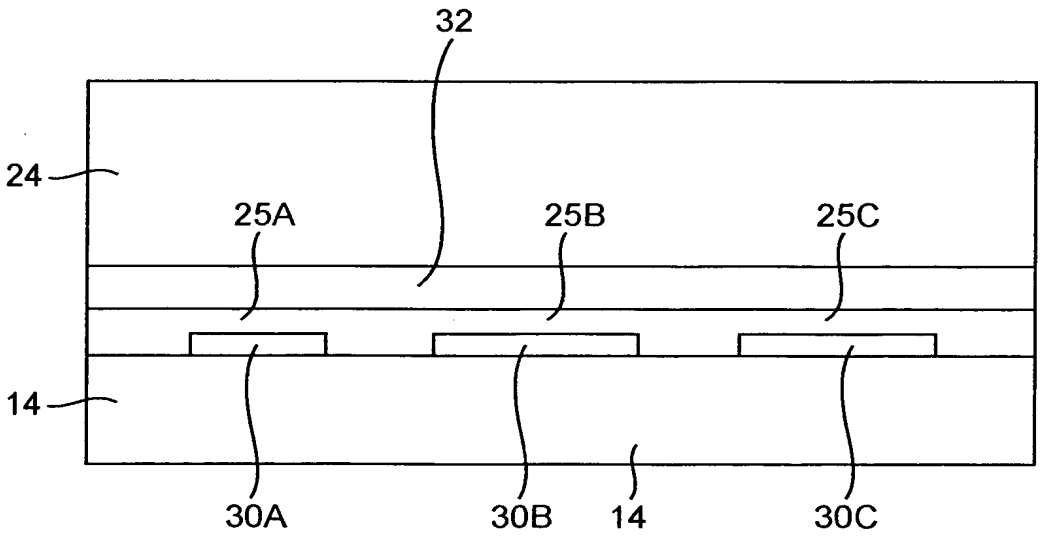


FIG. 15B

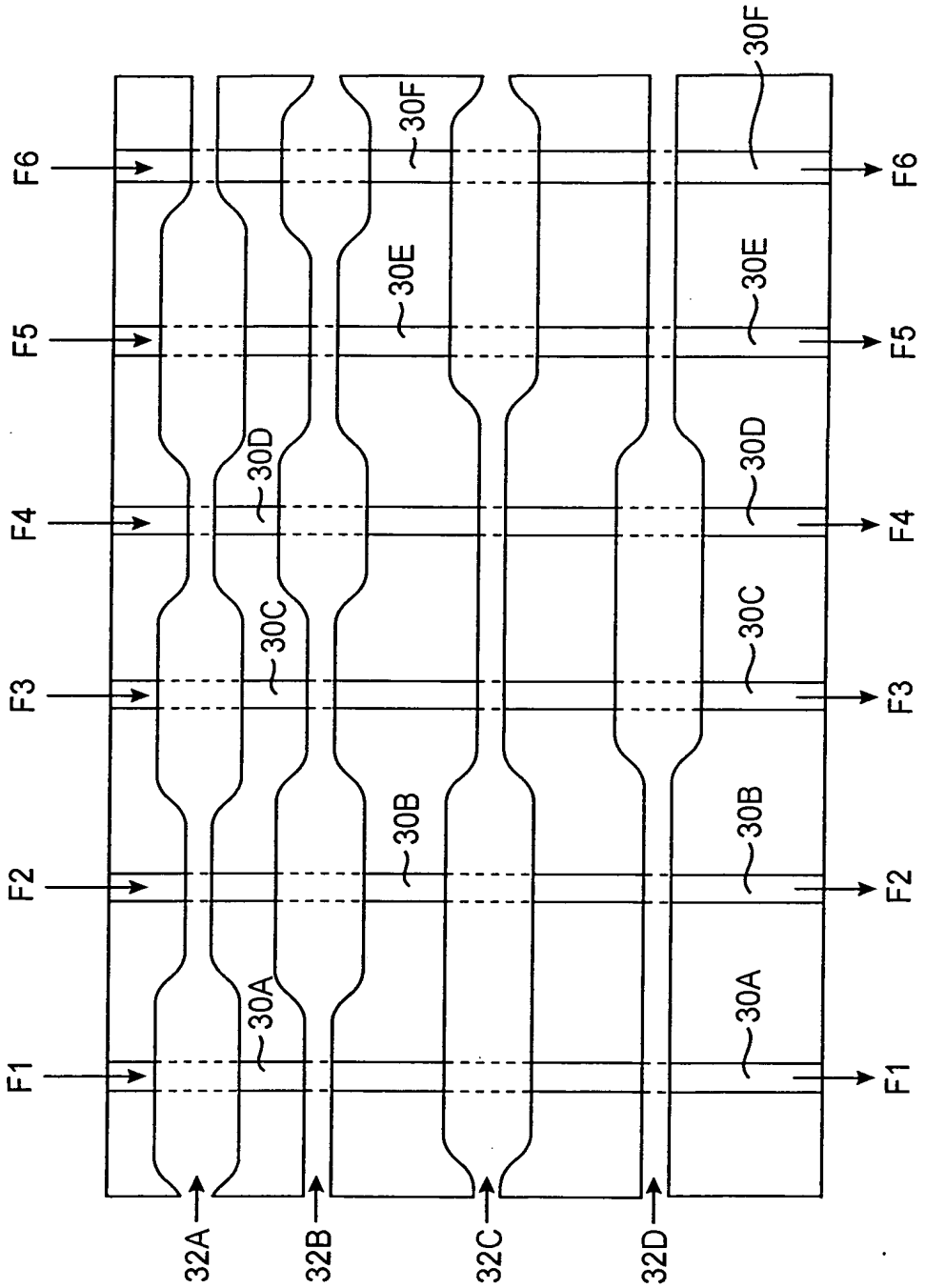


FIG. 16

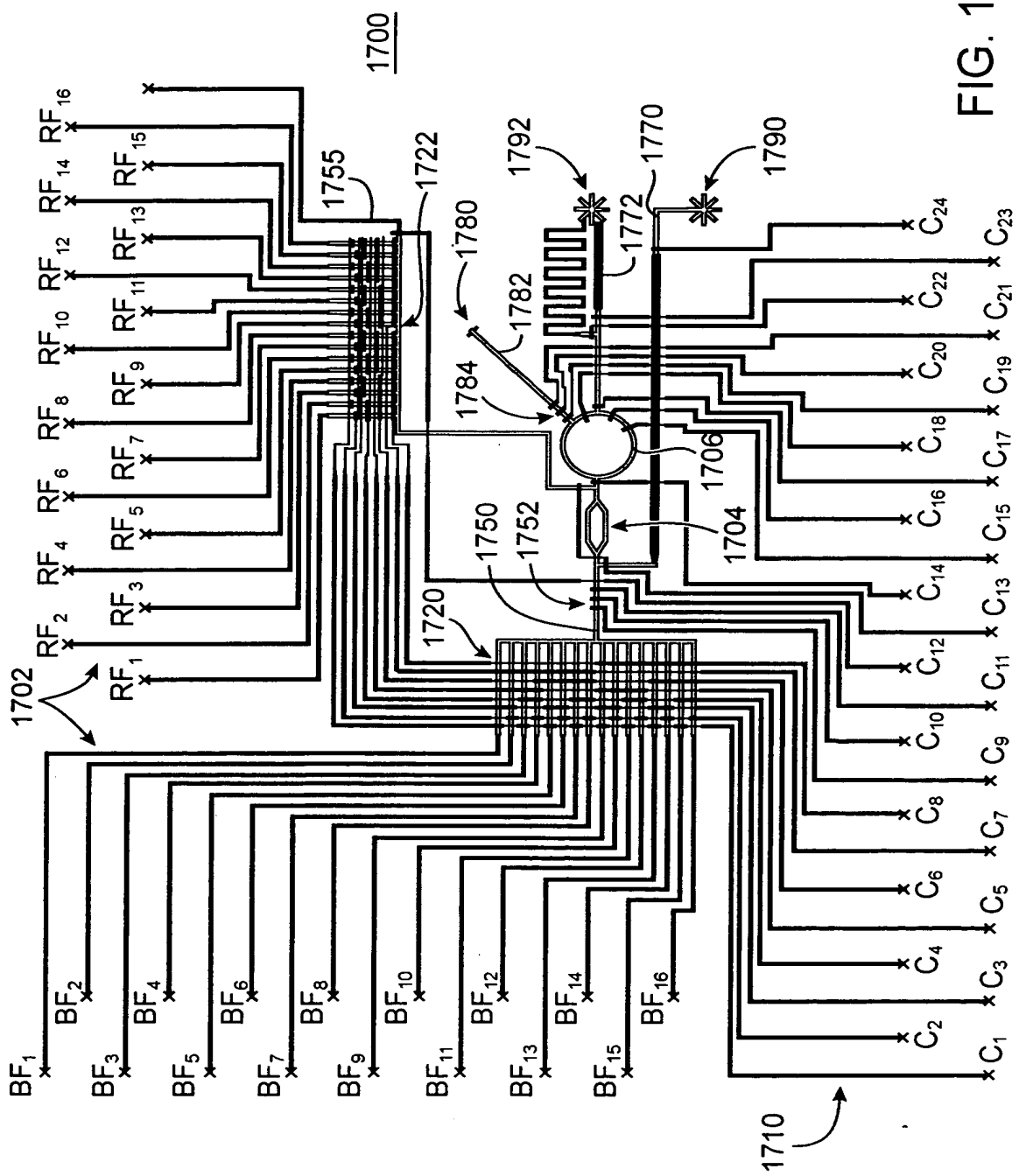

1700
1702
1704
1706
1710
1720
1722
1750
1752
1755
1770
1772
1780
1782
1784
1790
1792
RF1
RF2
RF3
RF4
RF5
RF6
RF7
RF8
RF9
RF10
RF11
RF12
RF13
RF14
RF15
RF16
BF1
BF2
BF3
BF4
BF5
BF6
BF7
BF8
BF9
BF10
BF11
BF12
BF13
BF14
BF15
BF16
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22
C23
C24

FIG. 17A

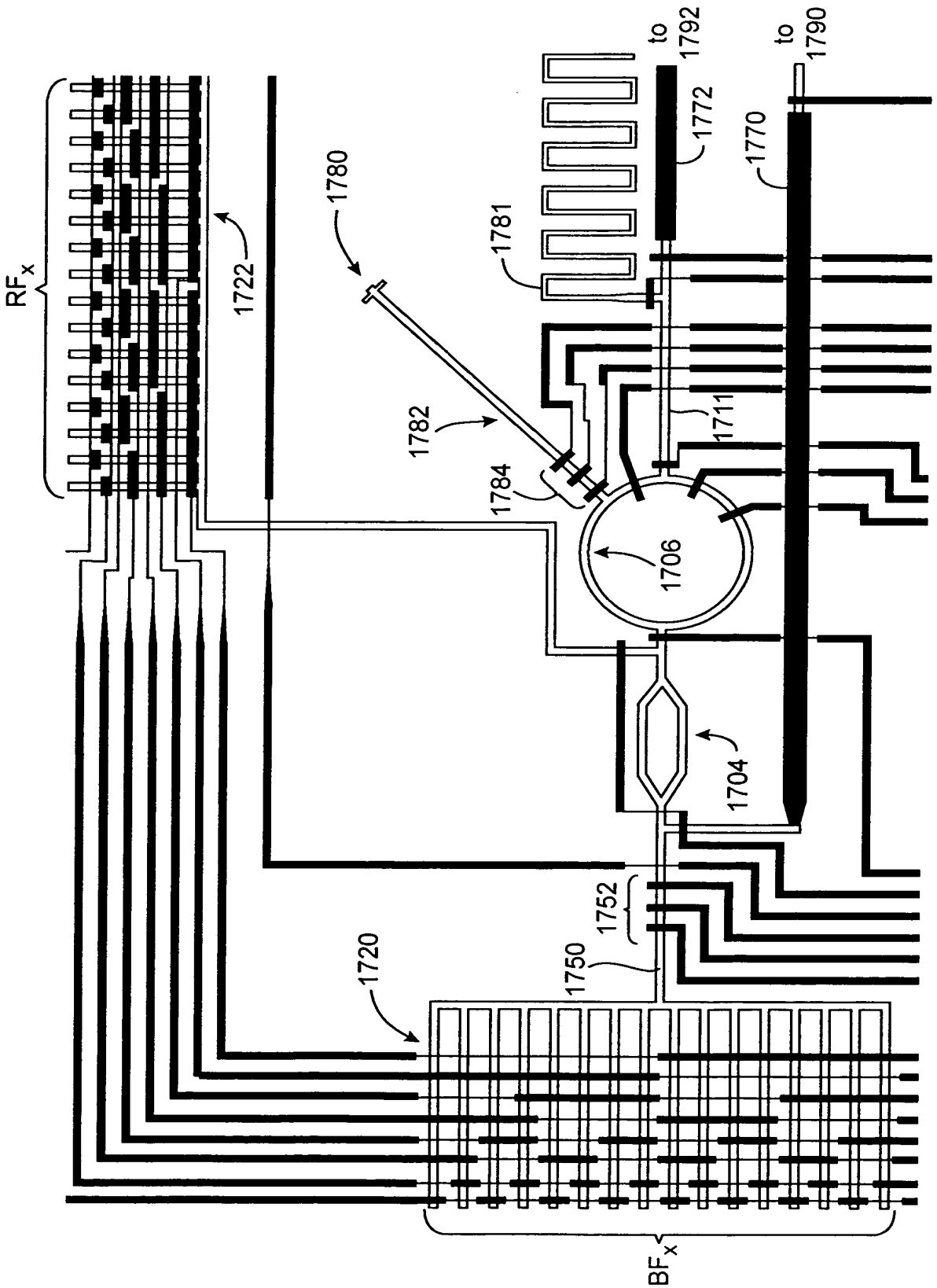

RFx
1722
1780
1781
1782
1784
1706
1704
1711
1772
1770
to 1792
to 1790
1752
1750
1720
BFx

FIG. 17B

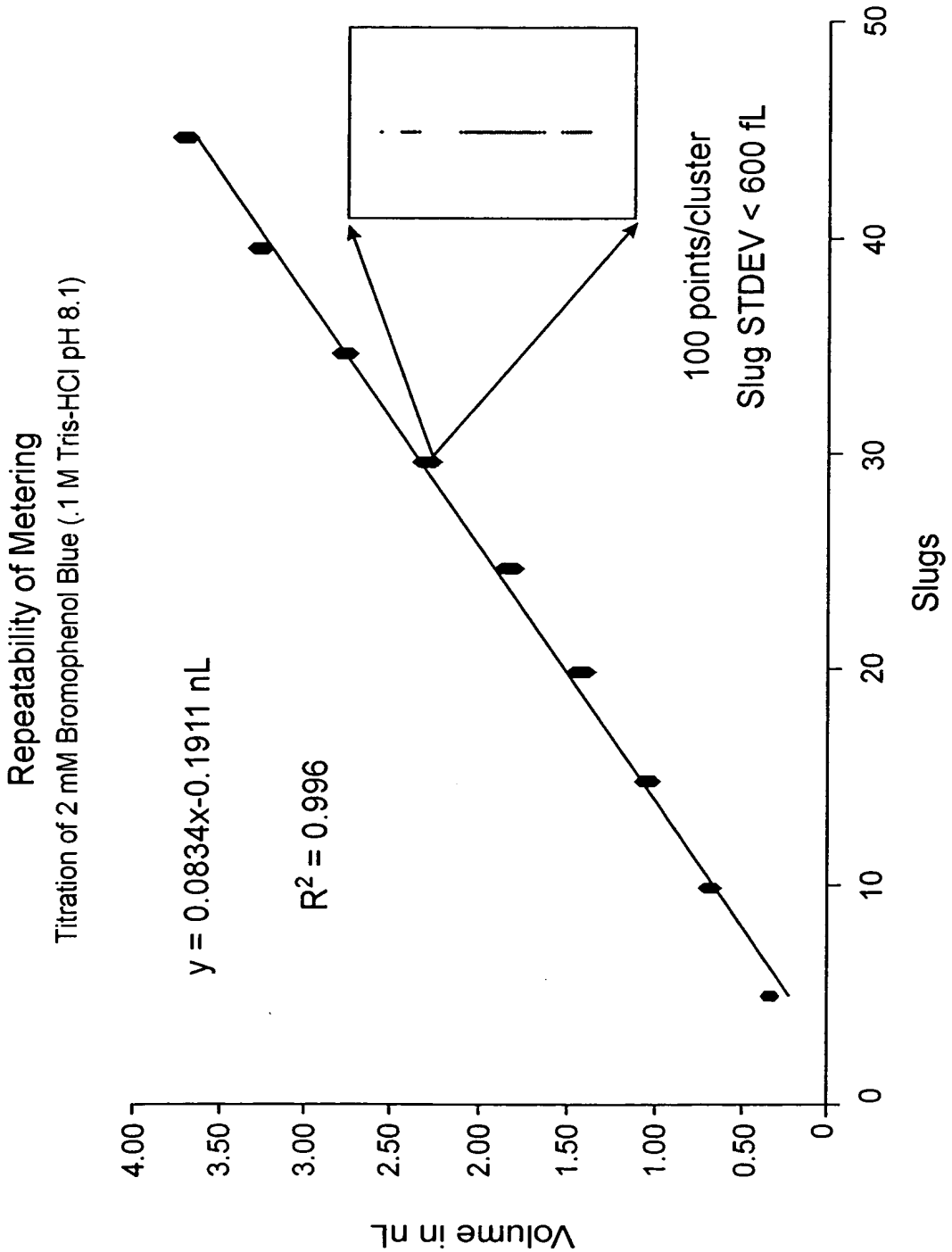

Repeatability of Metering
Titration of 2 mM Bromophenol Blue (.1 M Tris-HCl pH 8.1)
y = 0.0834x-0.1911 nL
R2 = 0.996
100 points/cluster
Slug STDEV < 600 fL
Volume in nL
Slugs
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0
0
10
20
30
40
50

FIG. 18

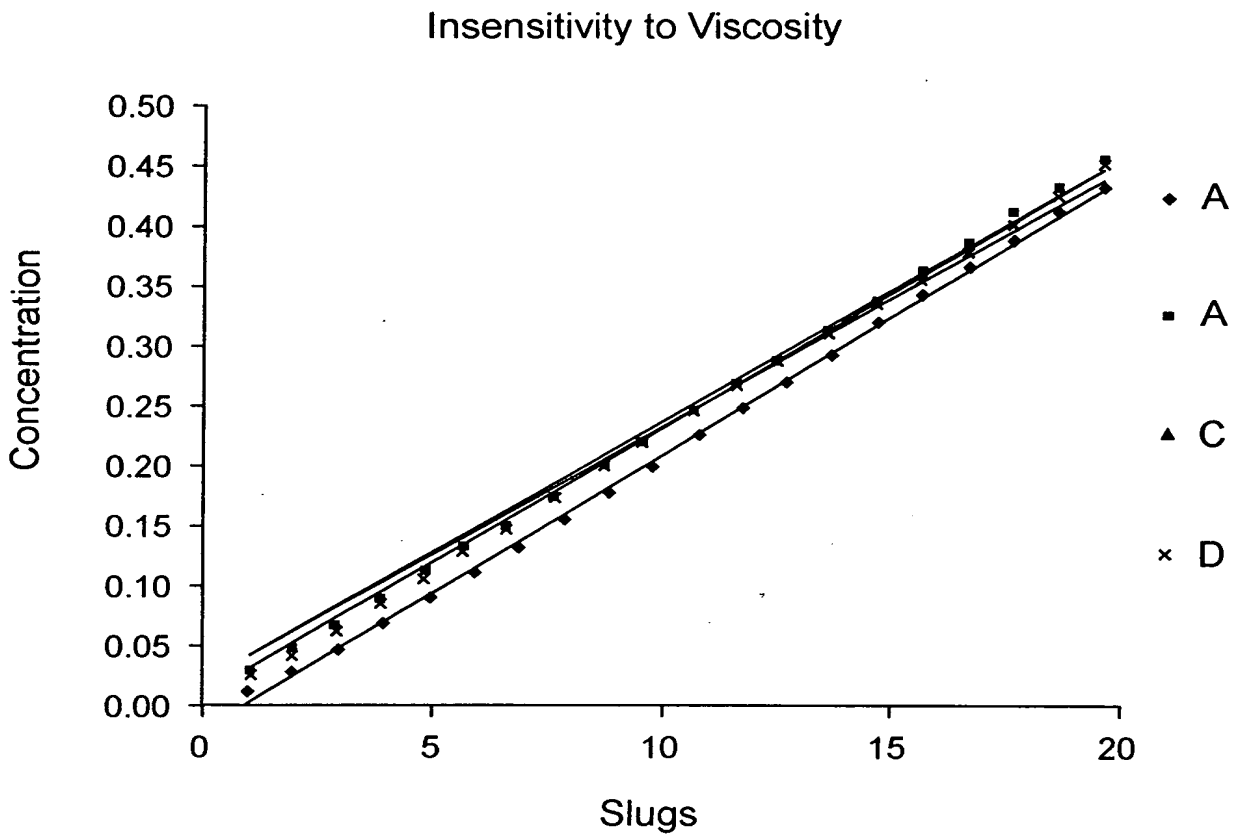

Insensitivity to Viscosity
Concentration
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0
5
10
15
20
Slugs
A
A
C
D

FIG. 19

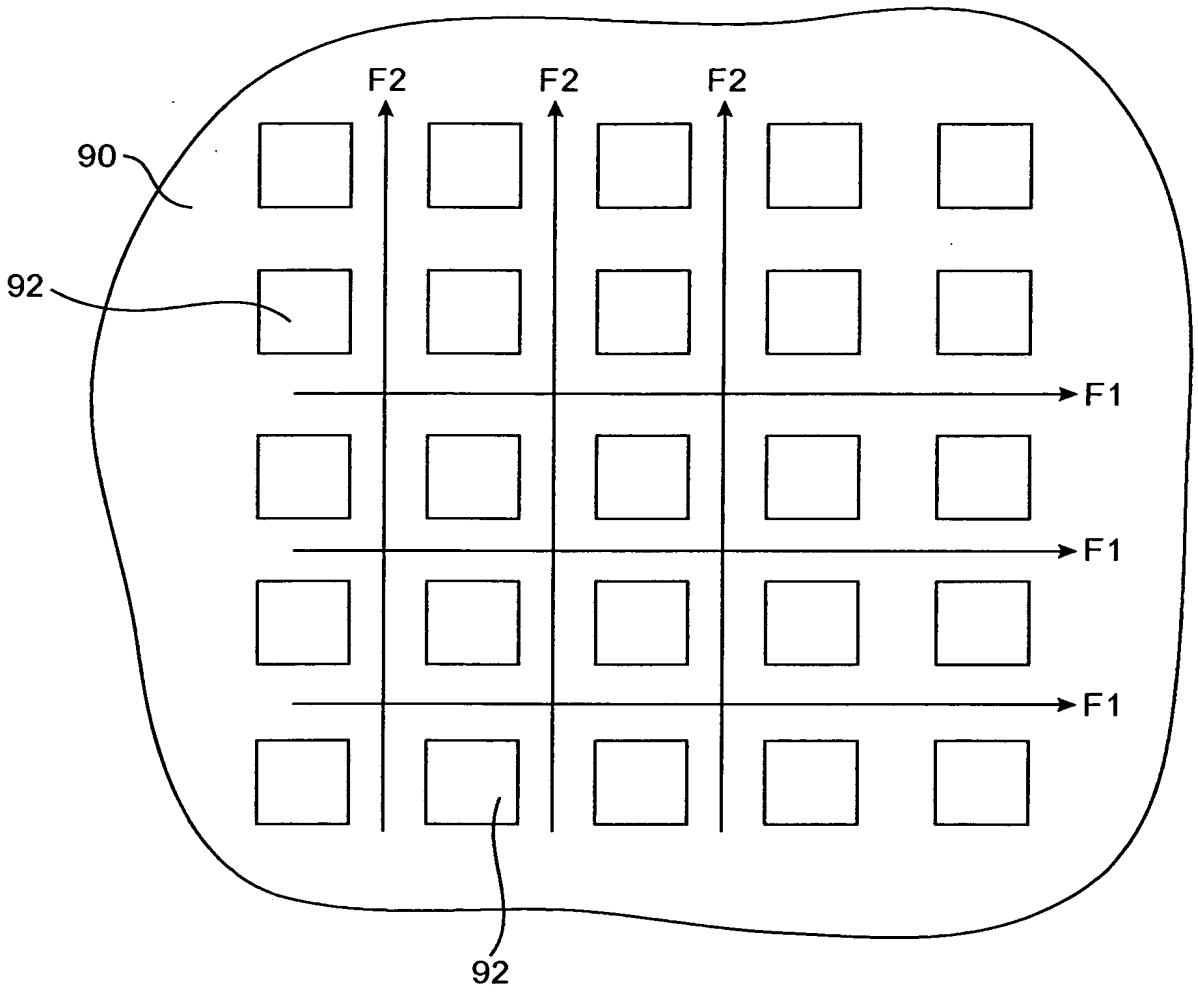


FIG. 20A

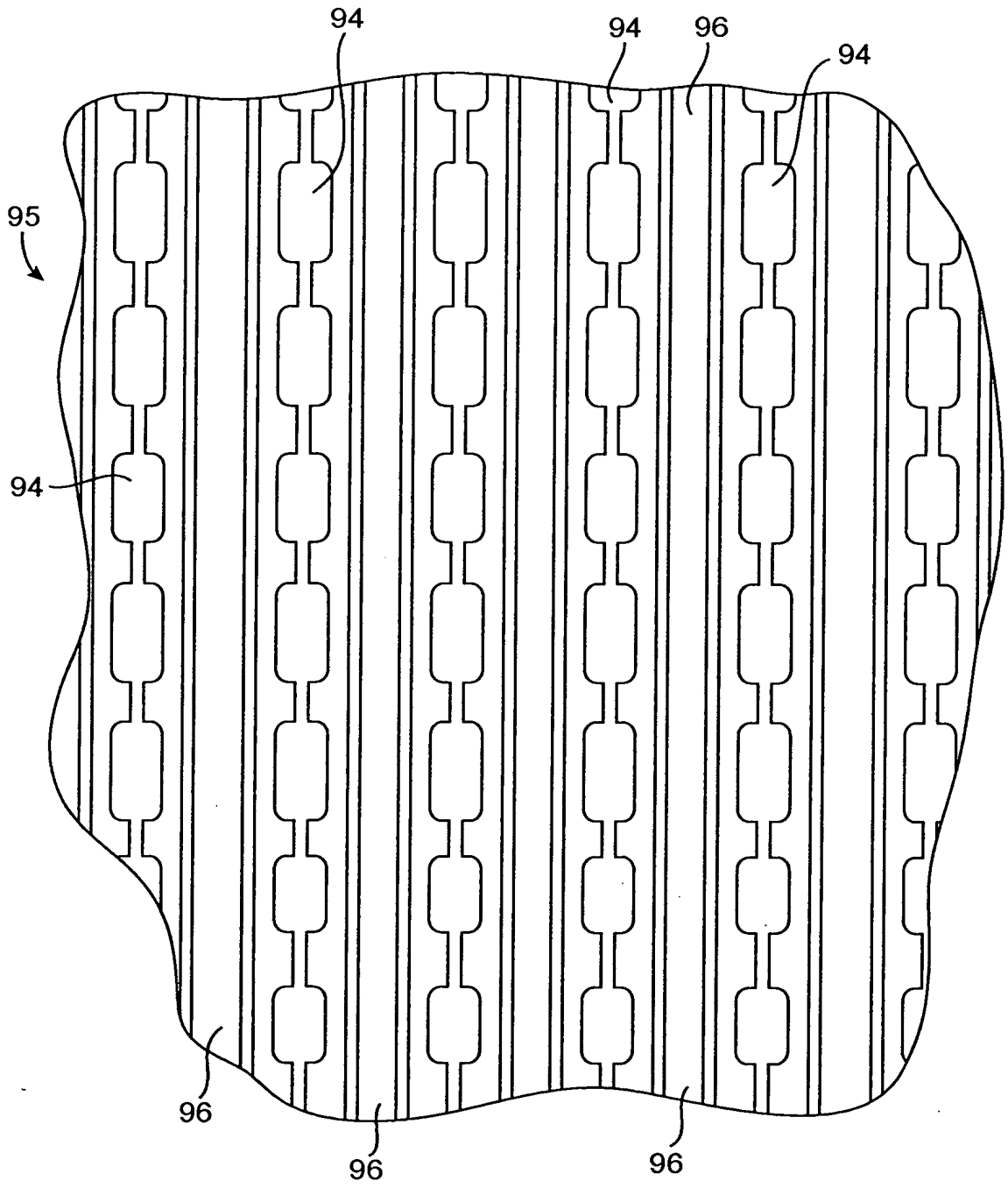


FIG 20B

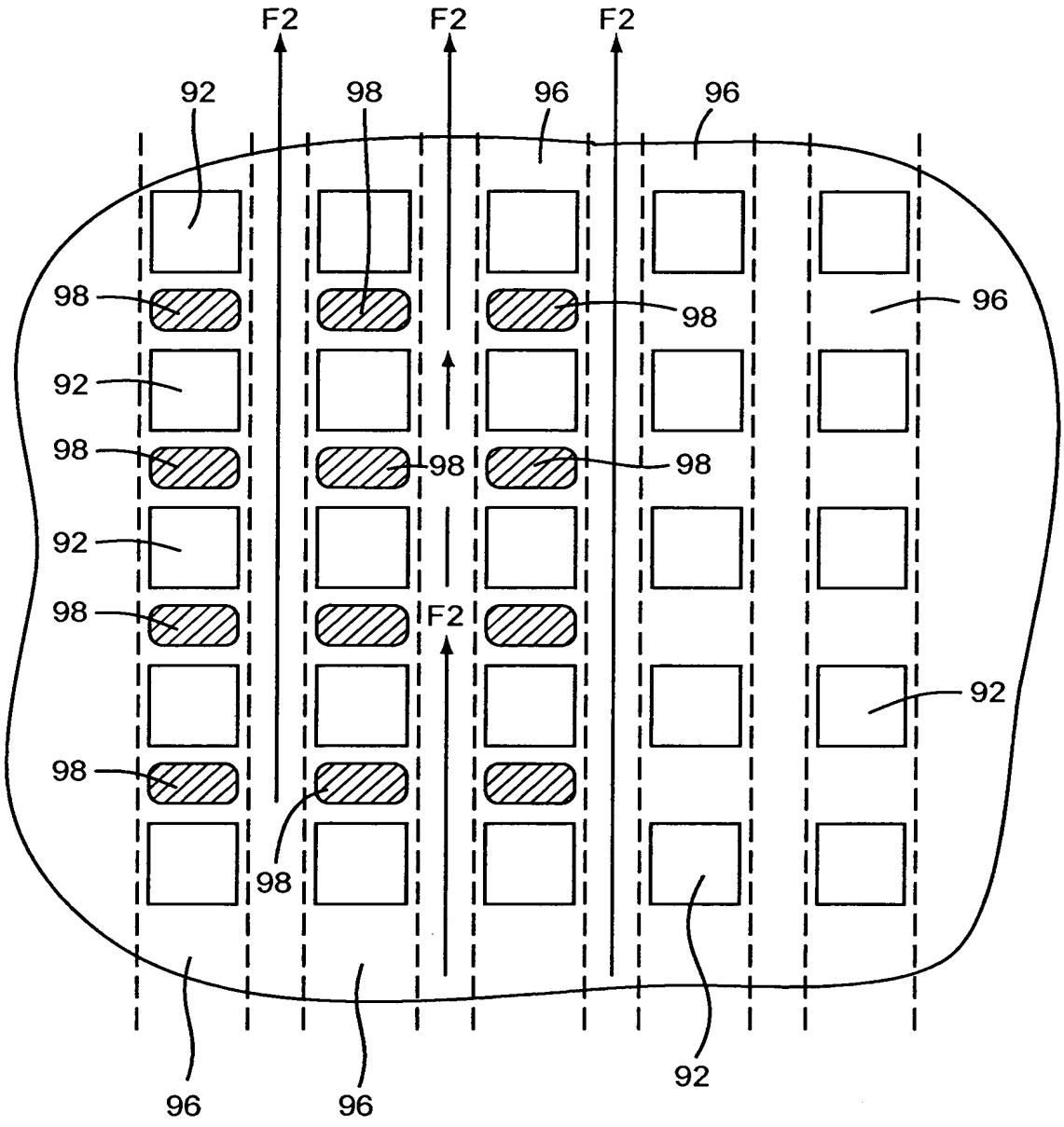


FIG. 20C

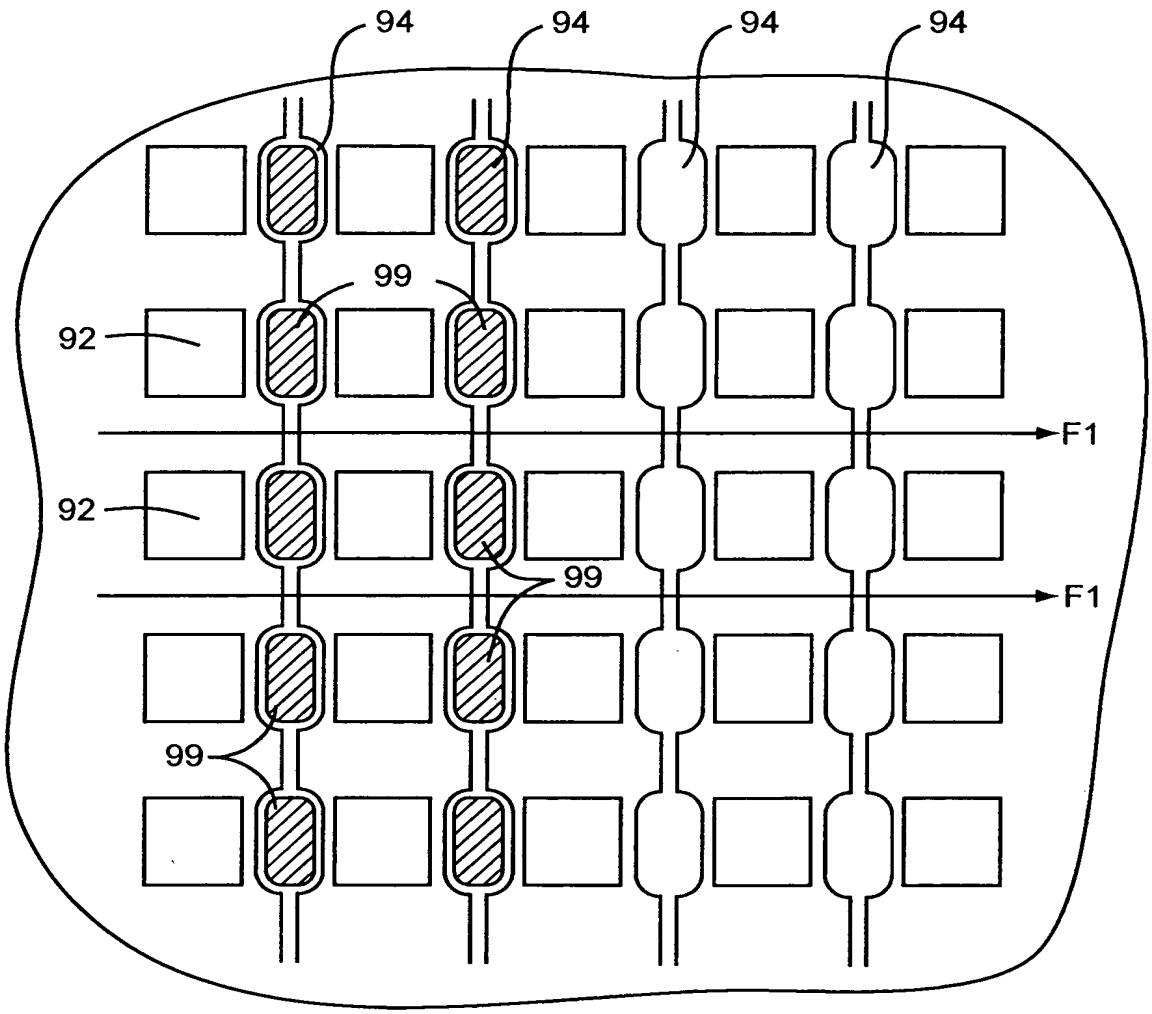


FIG. 20D

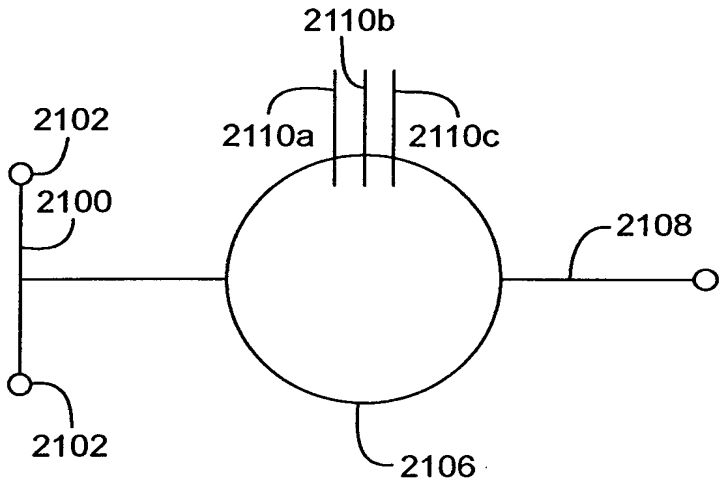


FIG. 21

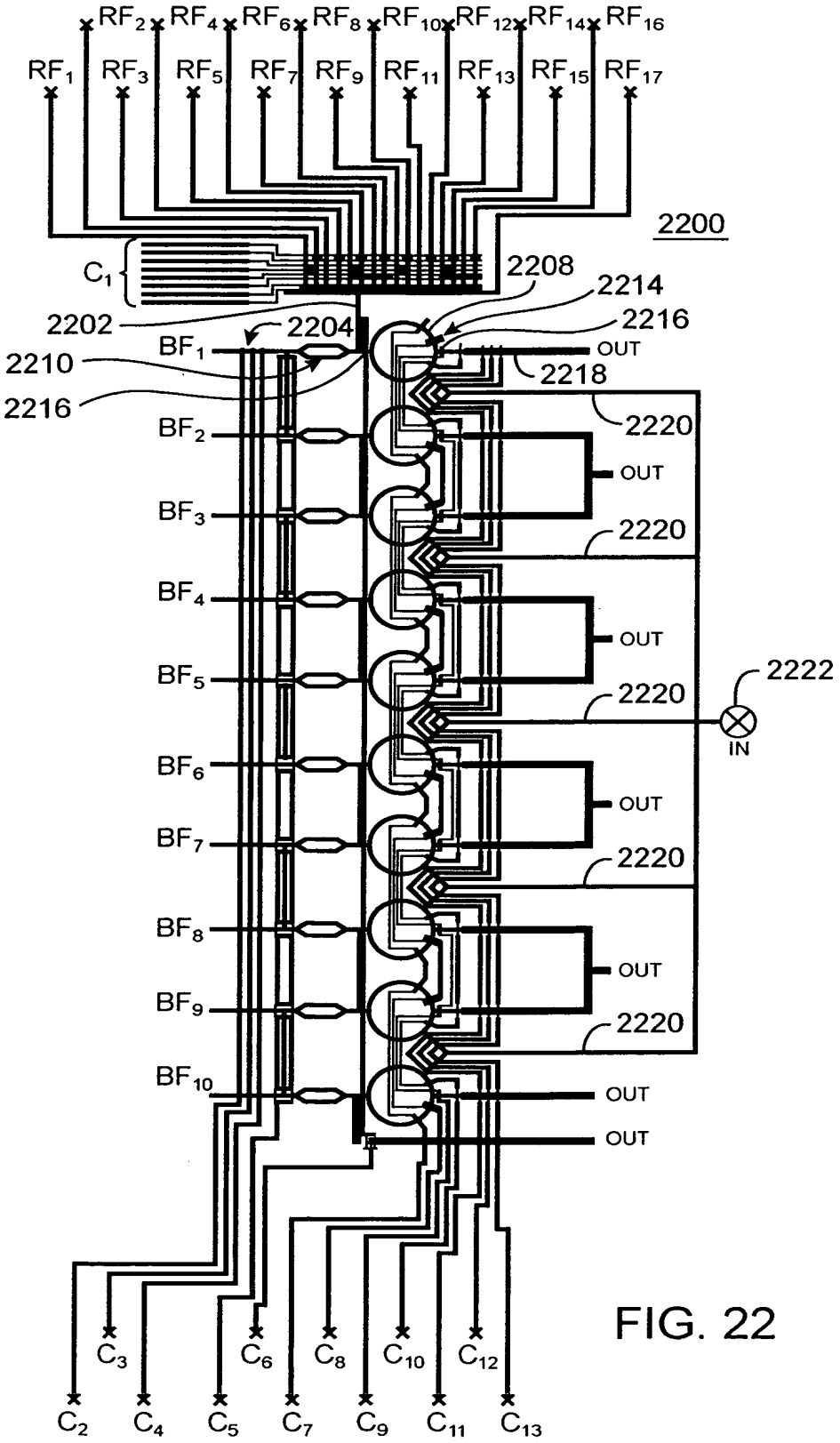

RF1
RF2
RF3
RF4
RF5
RF6
RF7
RF8
RF9
RF10
RF11
RF12
RF13
RF14
RF15
RF16
RF17
2200
C1
2208
2214
2216
2202
2204
BF1
OUT
2210
2218
2216
2220
BF2
OUT
BF3
2220
BF4
OUT
BF5
2222
2220
IN
BF6
OUT
BF7
2220
BF8
OUT
BF9
2220
BF10
OUT
OUT
C3
C6
C8
C10
C12
C2
C4
C5
C7
C9
C11
C13

FIG. 22

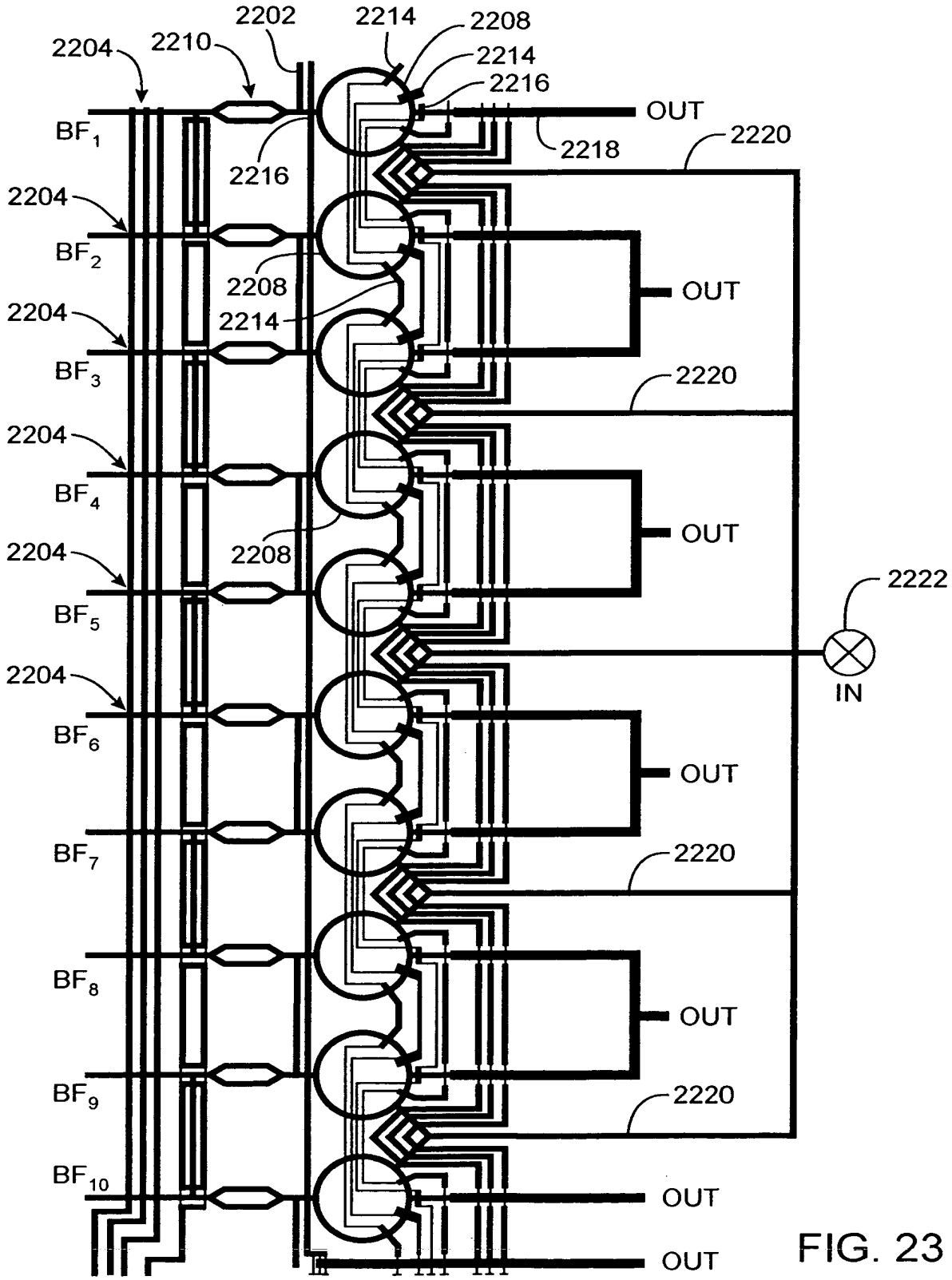

2202
2214
2208
2204
2210
2214
2216
OUT
2216
2218
2220
BF1
2204
BF2
2208
OUT
2214
2204
BF3
2220
2204
BF4
OUT
2208
2204
BF5
2222
IN
2204
BF6
OUT
BF7
2220
BF8
OUT
BF9
2220
BF10
OUT
OUT

FIG. 23

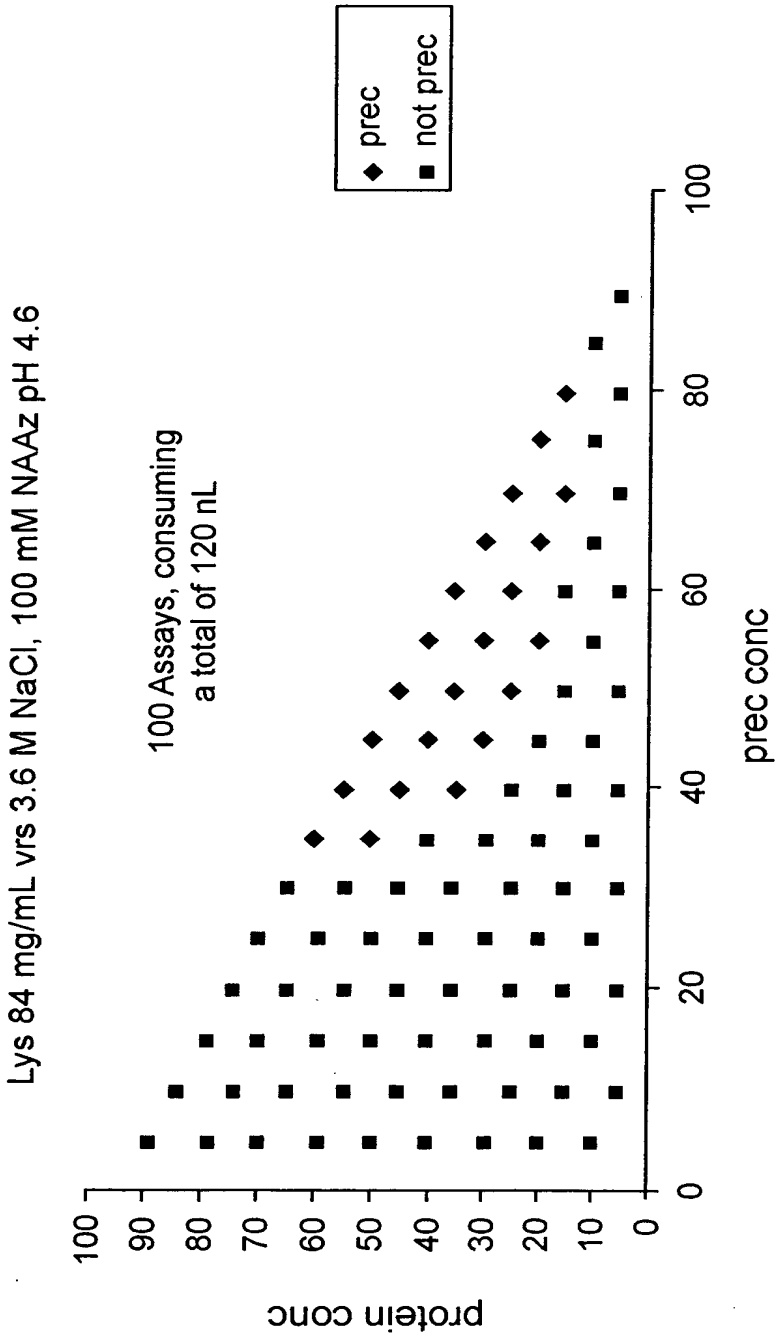

Lys 84 mg/mL vrs 3.6 M NaCl, 100 mM NAAz pH 4.6
100 Assays, consuming
a total of 120 nL
prec
not prec
protein conc
prec conc
0
10
20
30
40
50
60
70
80
90
100
0
20
40
60
80
100

FIG. 24

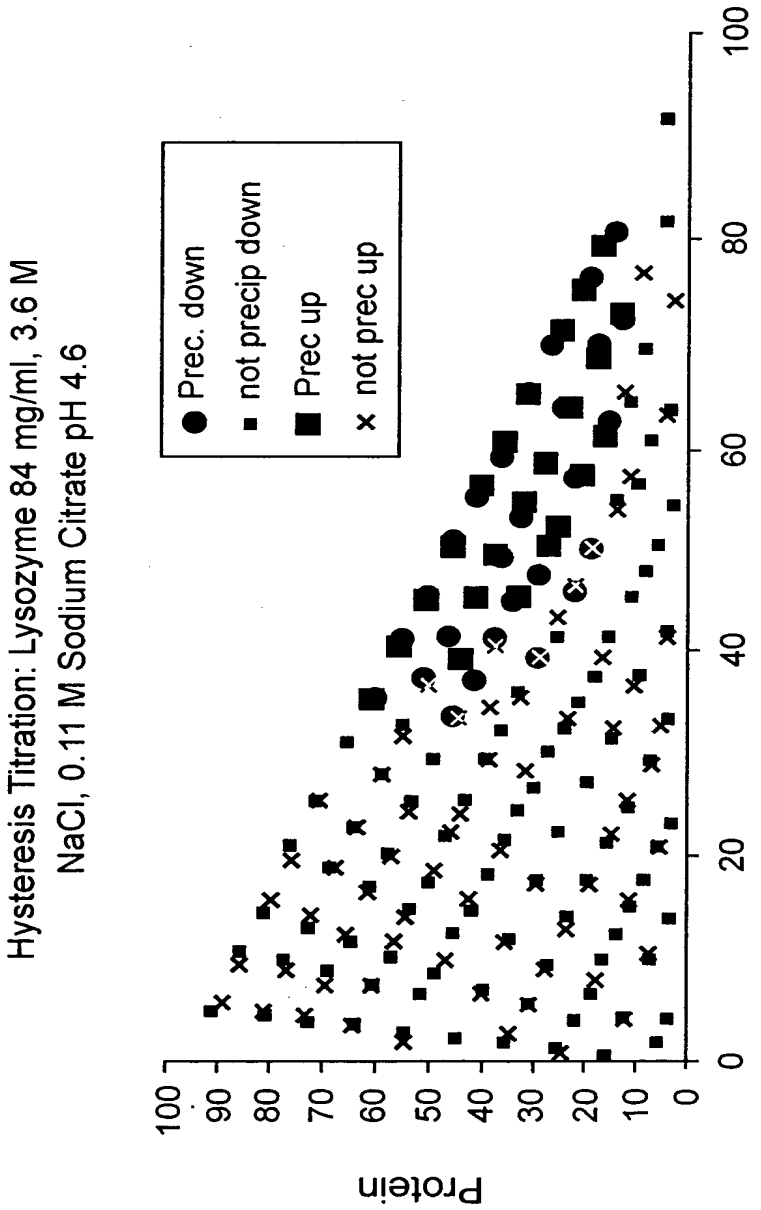

Hysteresis Titration: Lysozyme 84 mg/ml, 3.6 M
NaCl, 0.11 M Sodium Citrate pH 4.6
Prec. down
not precip down
Prec up
not prec up
Protein
Precipitant
0
10
20
30
40
50
60
70
80
90
100
0
20
40
60
80
100

FIG. 25

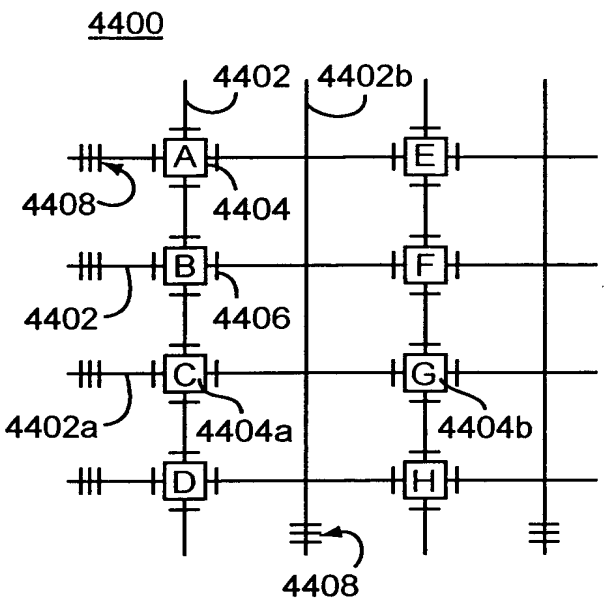


FIG. 26A

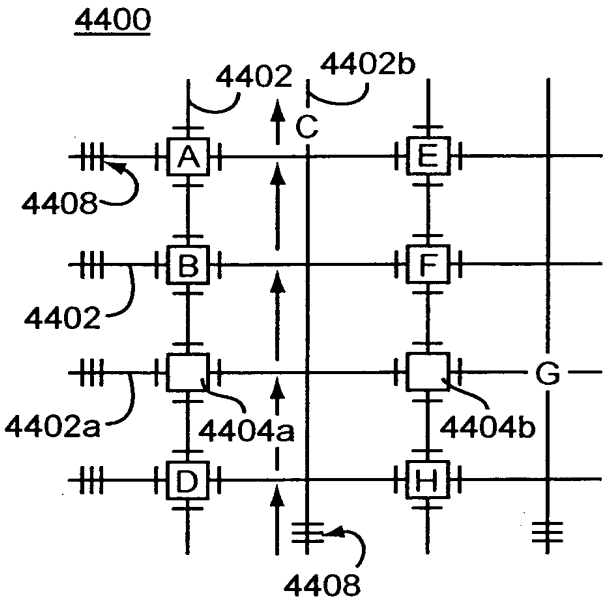


FIG. 26C

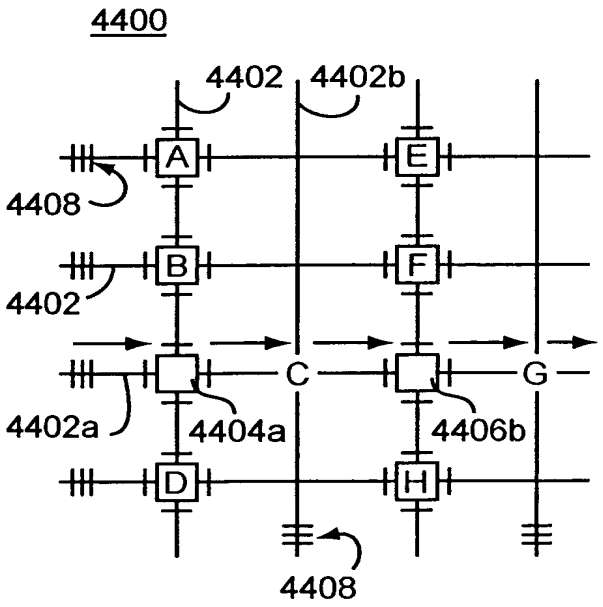


FIG. 26B

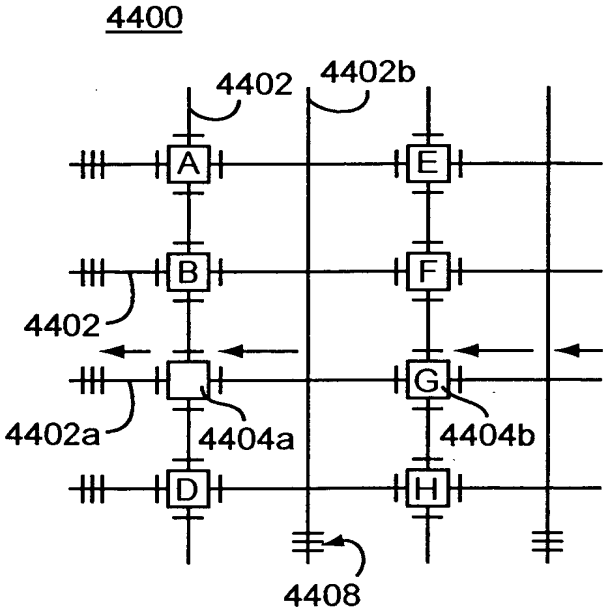


FIG. 26D

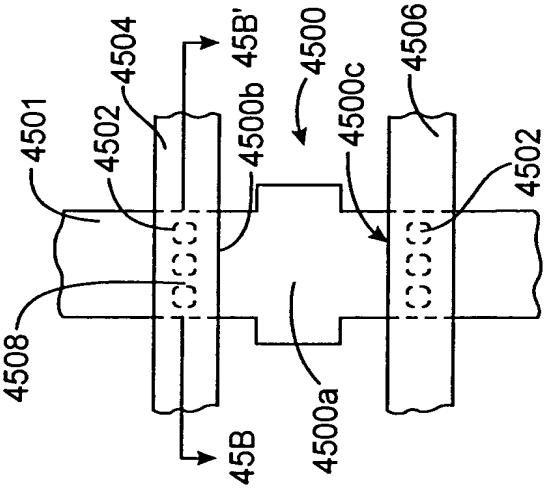


FIG. 27A

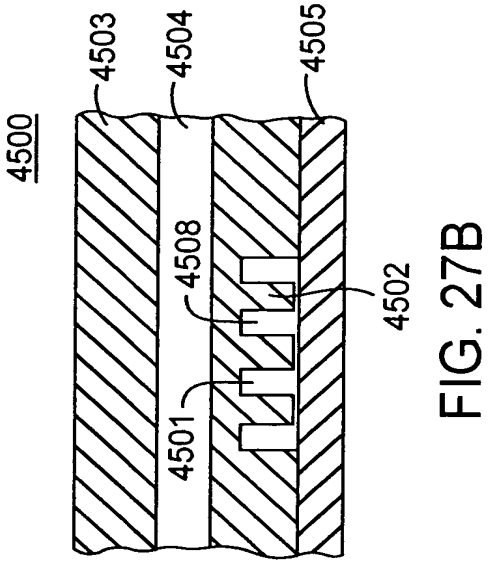


FIG. 27B

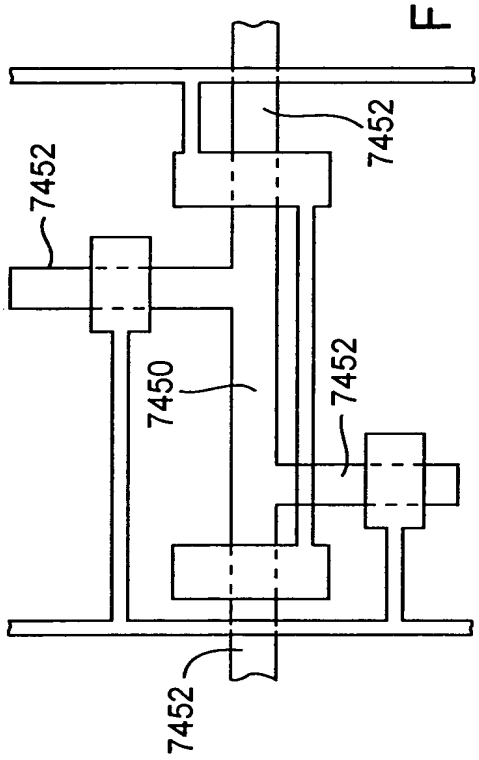


FIG. 28C

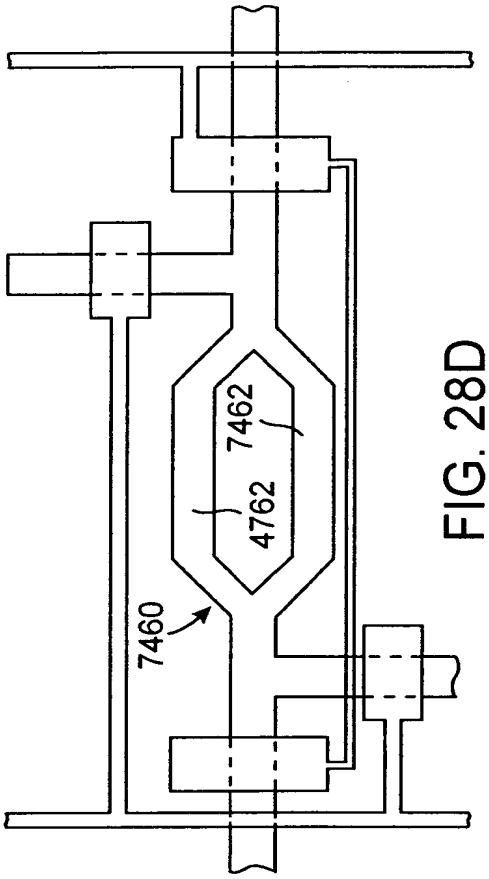


FIG. 28D

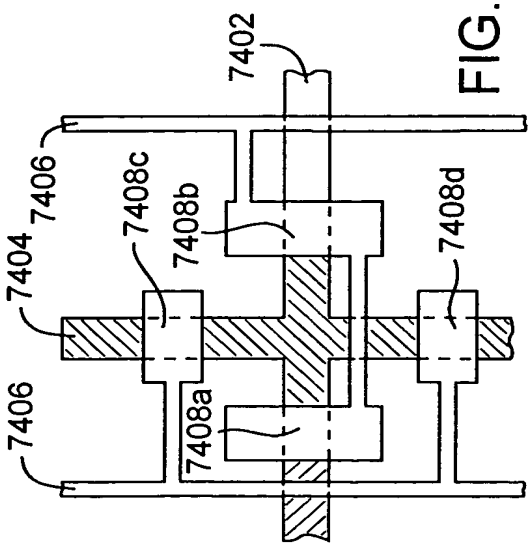


FIG. 28A

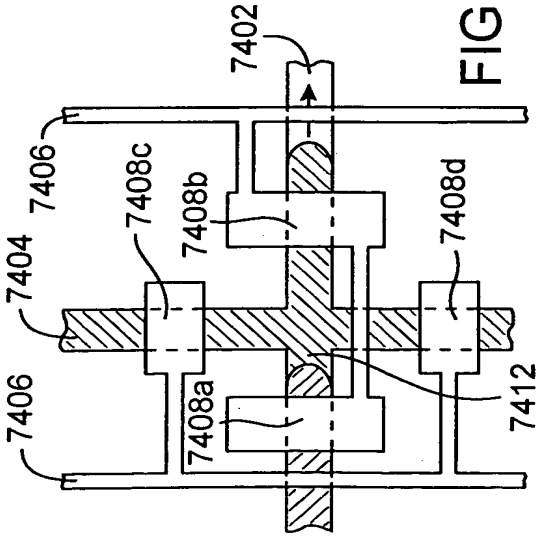


FIG. 28B

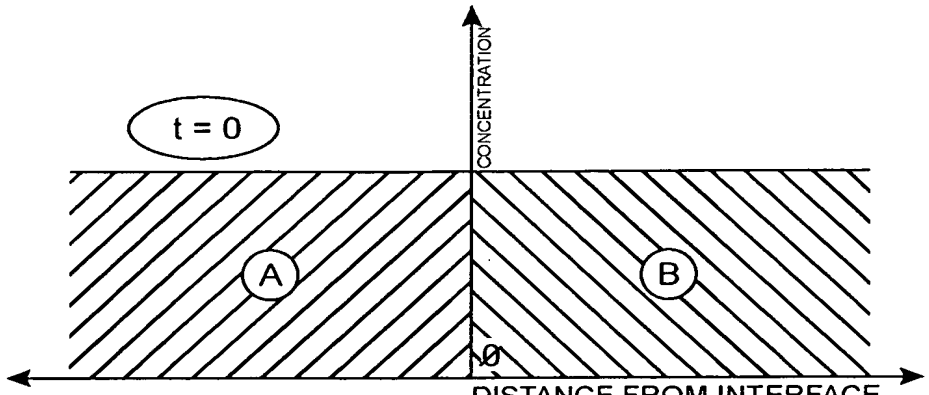


FIG. 29A

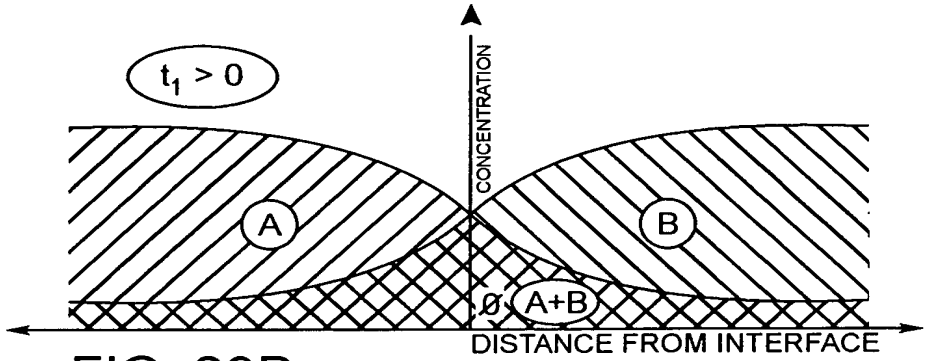


FIG. 29B

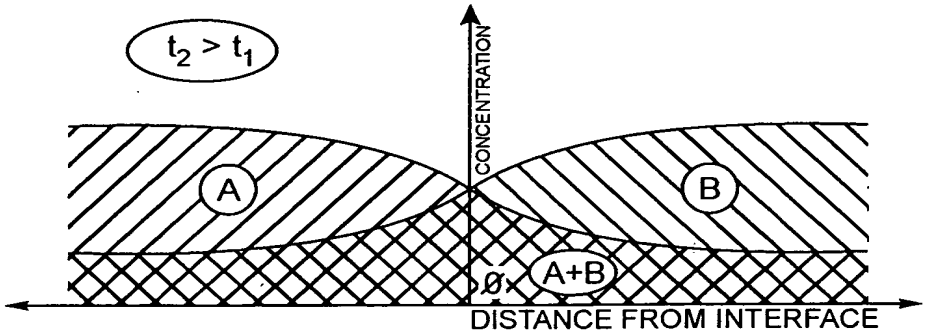


FIG. 29C

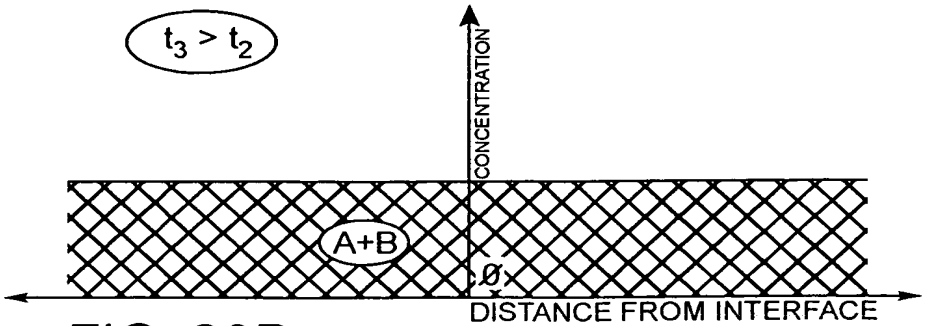


FIG. 29D

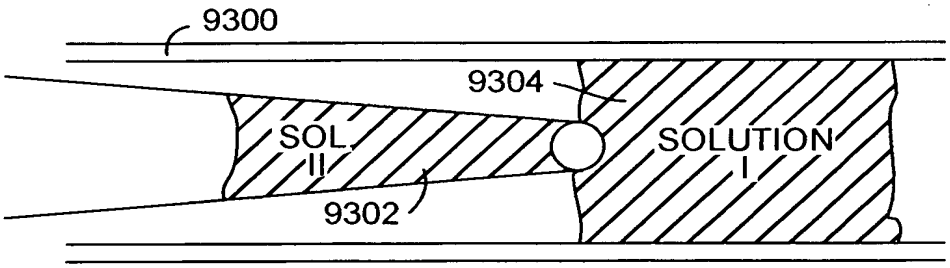


FIG. 30A
(Prior Art)

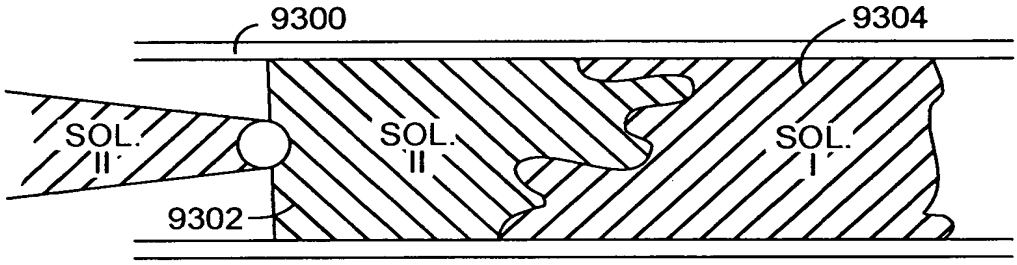


FIG. 30B
(Prior Art)

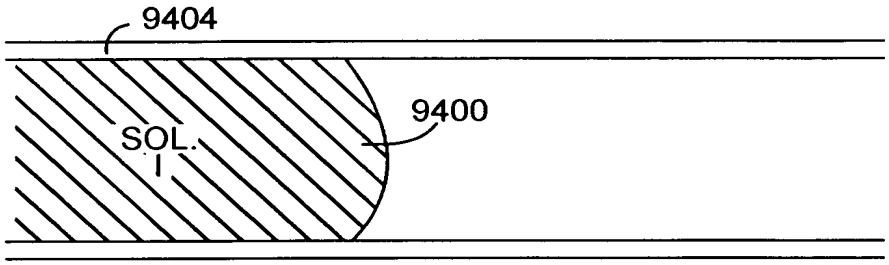


FIG. 31A
(Prior Art)

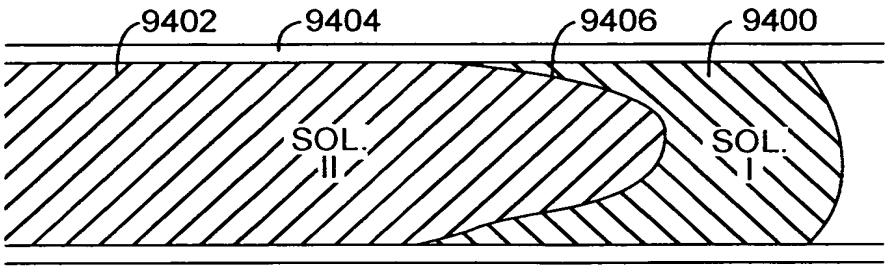


FIG. 31B
(Prior Art)

$t=0$; $e_I > e_{II}$

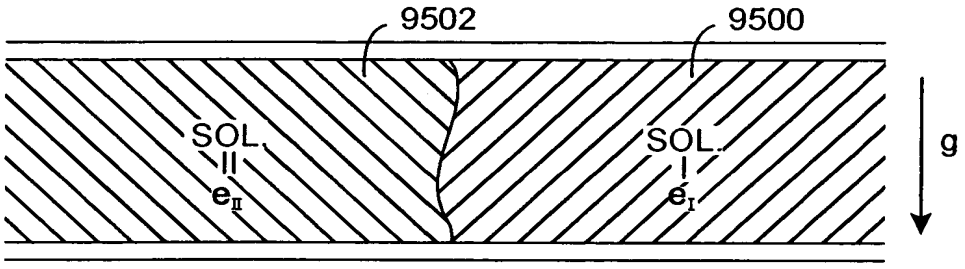


FIG. 32A
(Prior Art)

$t_1 > 0$

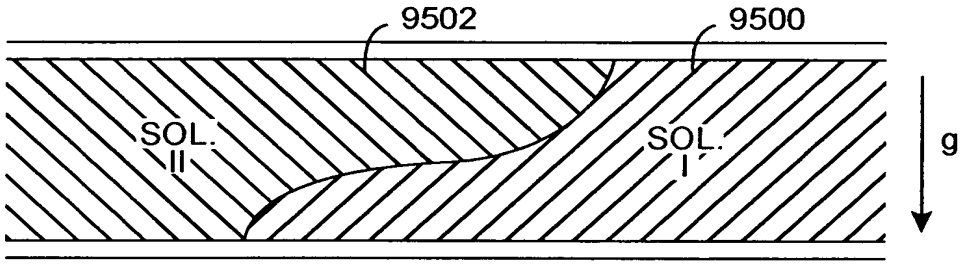


FIG. 32B
(Prior Art)

$t_2 > t_1$

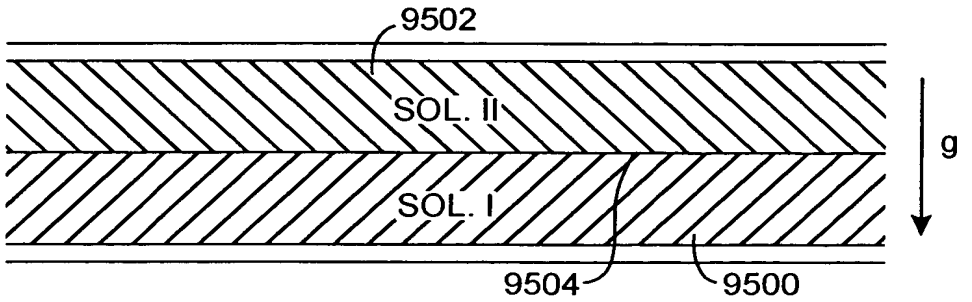


FIG. 32C
(Prior Art)

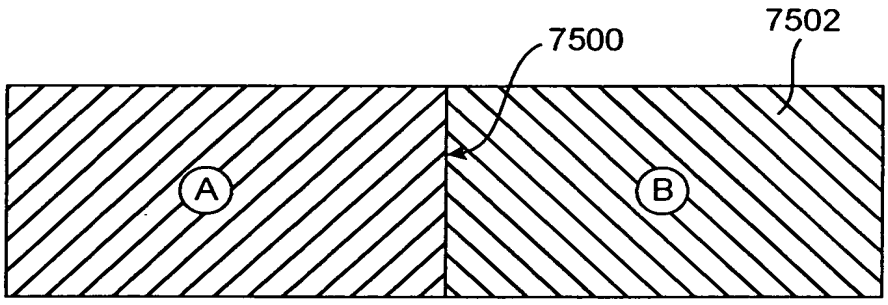


FIG. 33A

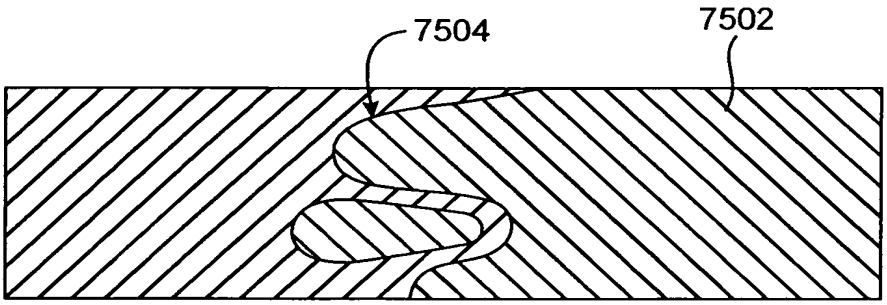


FIG. 33B
(PRIOR ART)

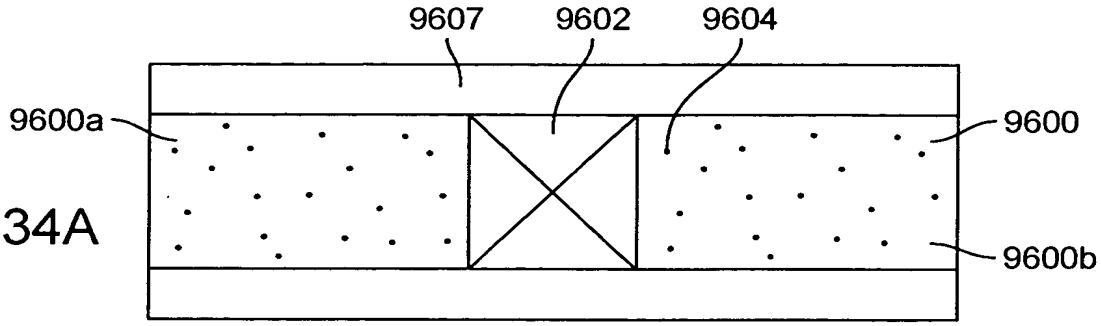


FIG. 34A

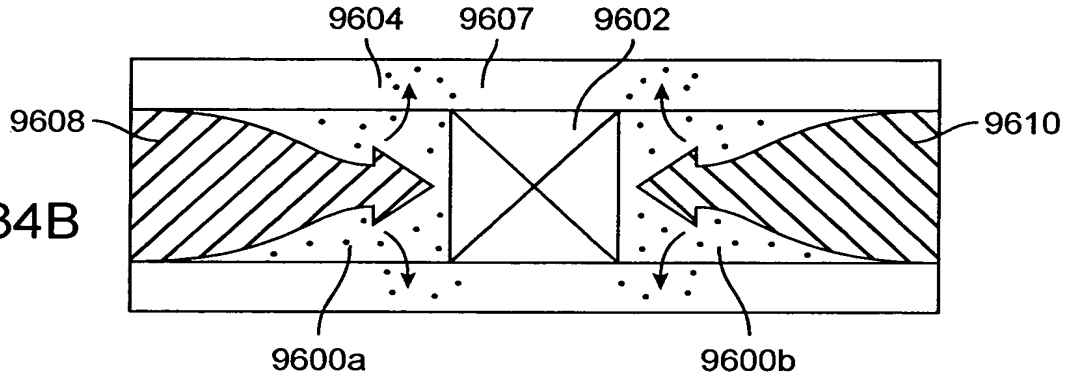


FIG. 34B

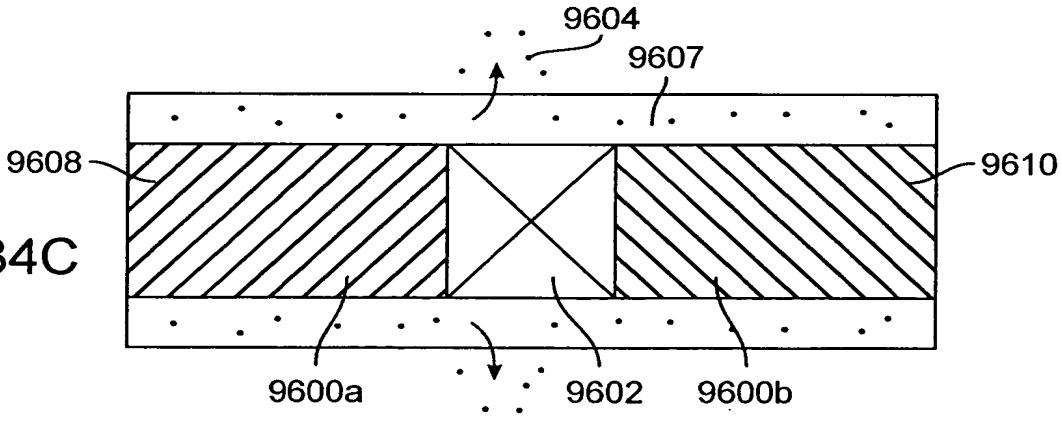


FIG. 34C

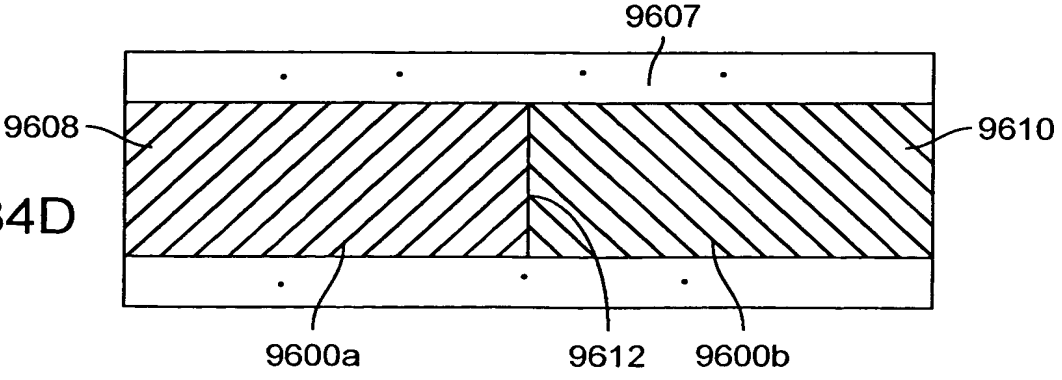


FIG. 34D

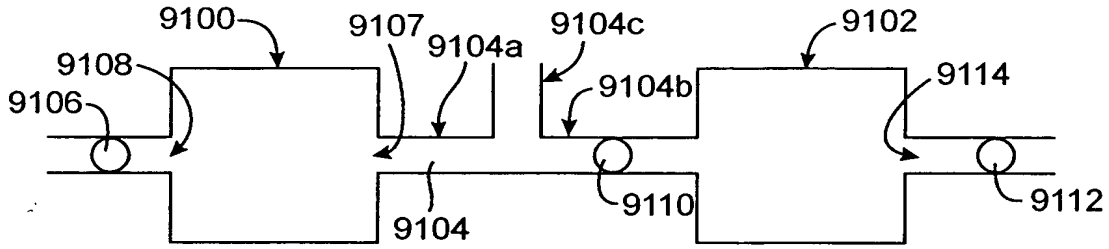


FIG. 35A

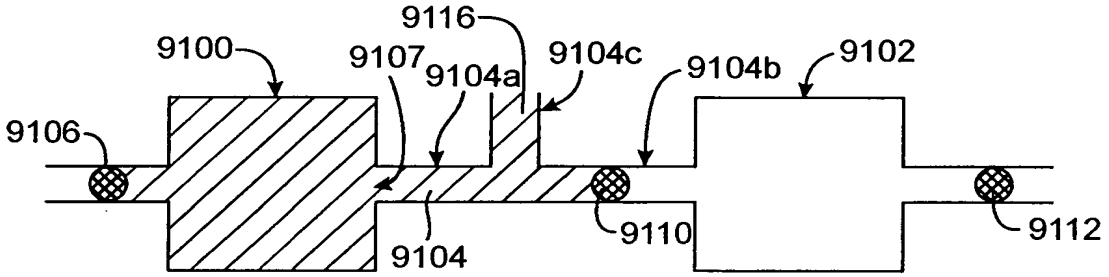


FIG. 35B

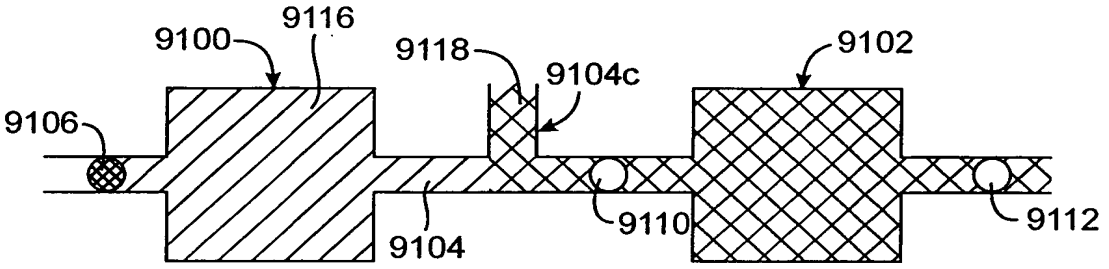


FIG. 35C

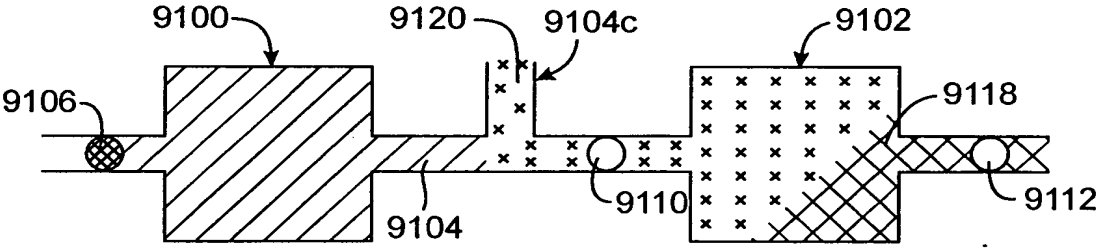


FIG. 35D

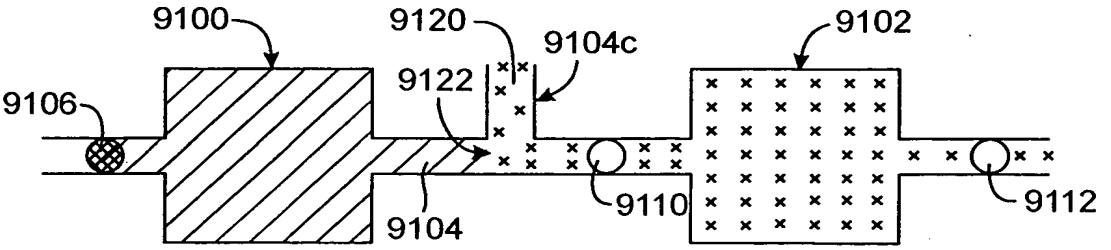


FIG. 35E

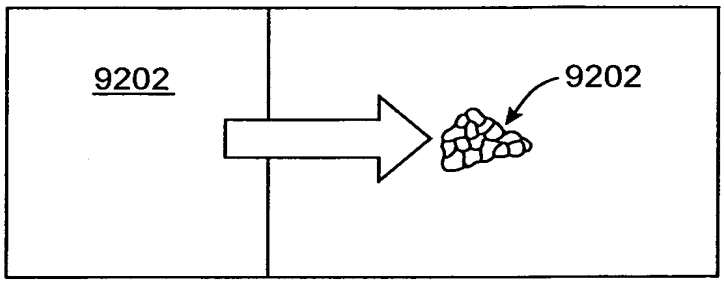


FIG. 36A
(Prior Art)

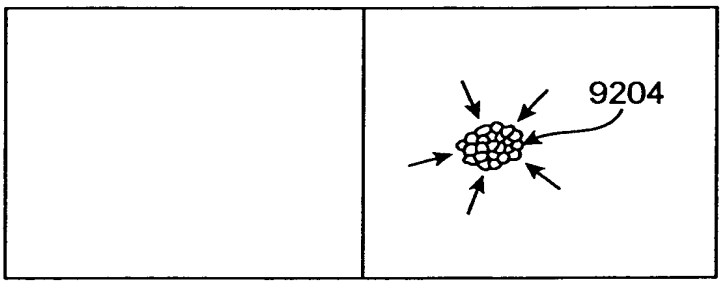


FIG. 36B

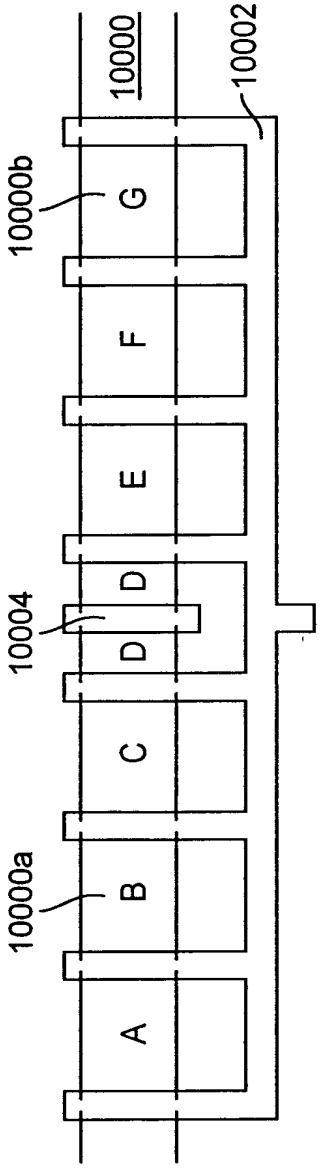


FIG. 37A

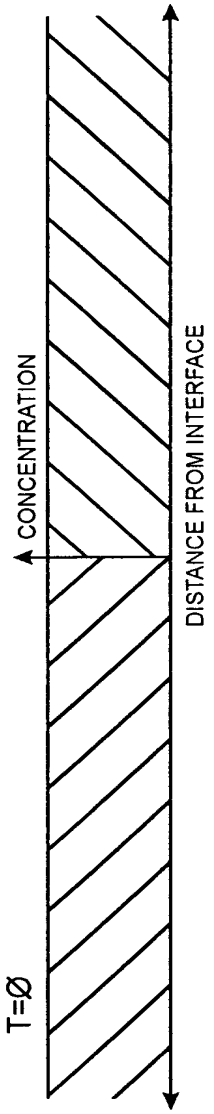


FIG. 37B

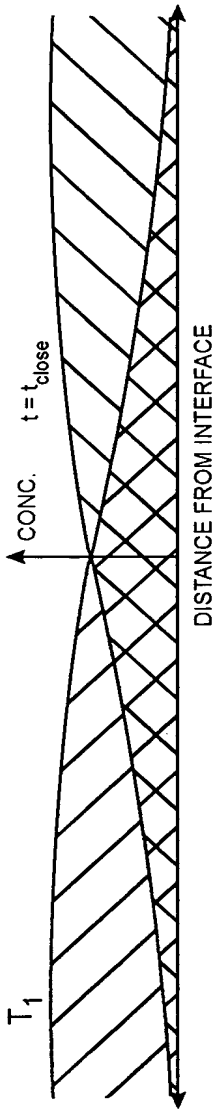


FIG. 37C

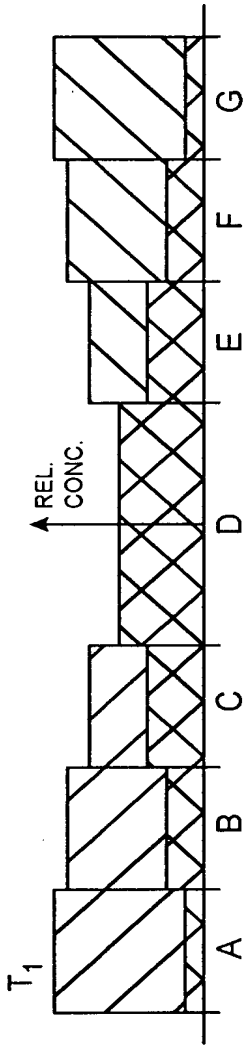


FIG. 37D

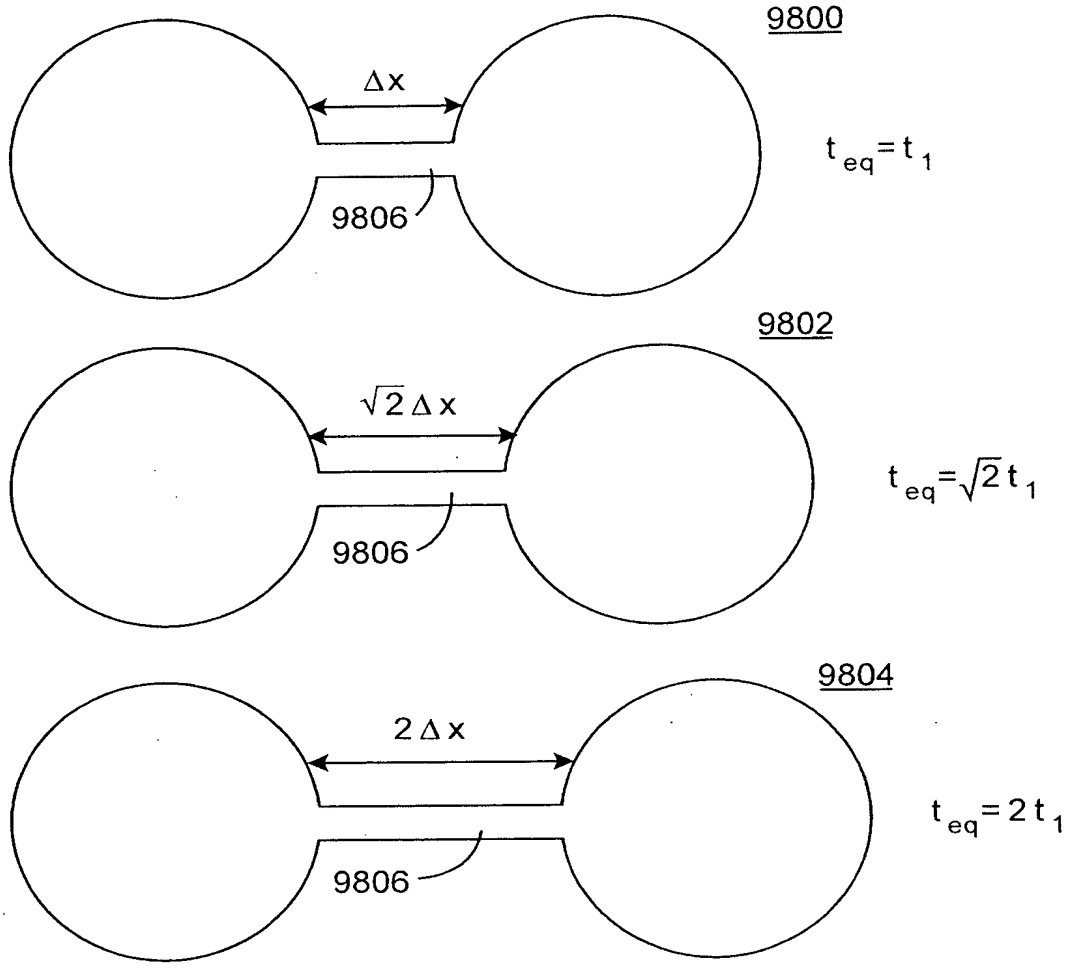


FIG. 38A

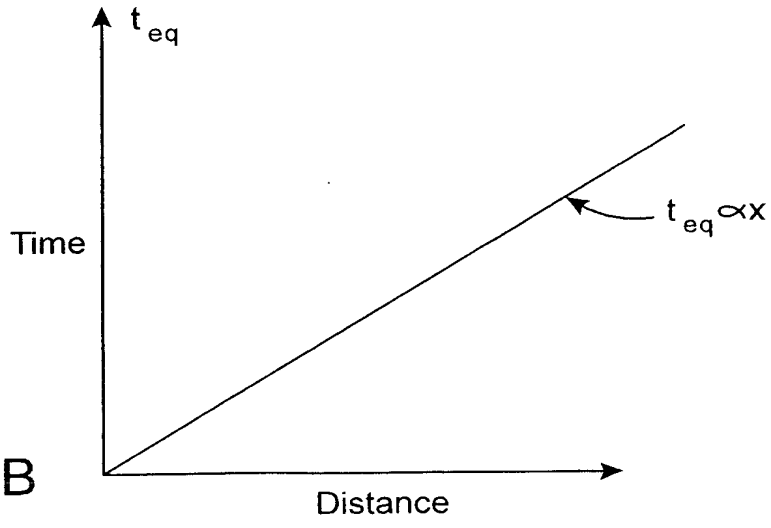


FIG. 38B

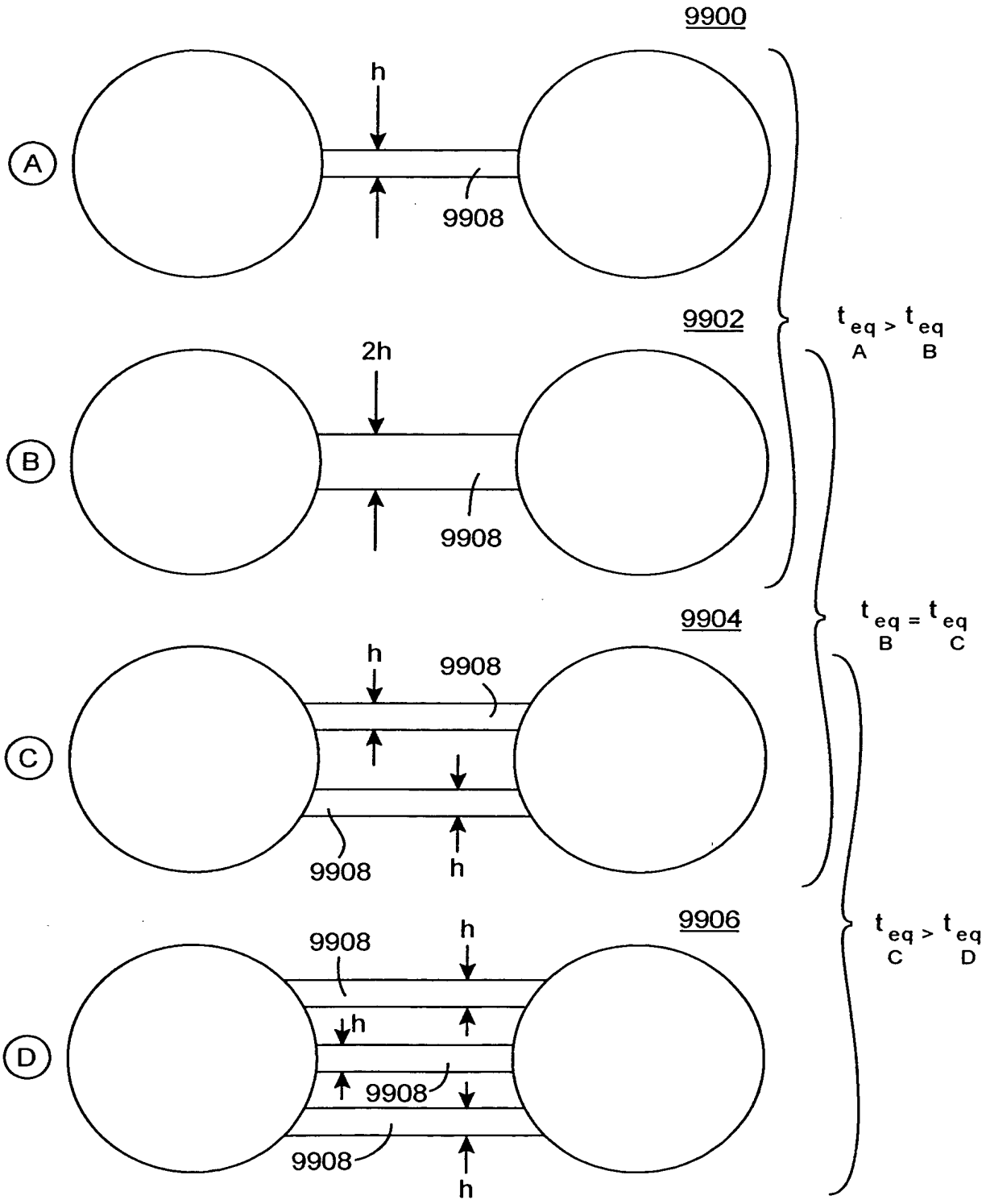

9900
h
A
9908
9902
2h
B
9908
t_{eq} > t_{eq}
A B
9904
h
9908
C
9908
h
t_{eq} = t_{eq}
B C
9906
9908
h
h
D
9908
9908
h
t_{eq} > t_{eq}
C D

FIG. 39

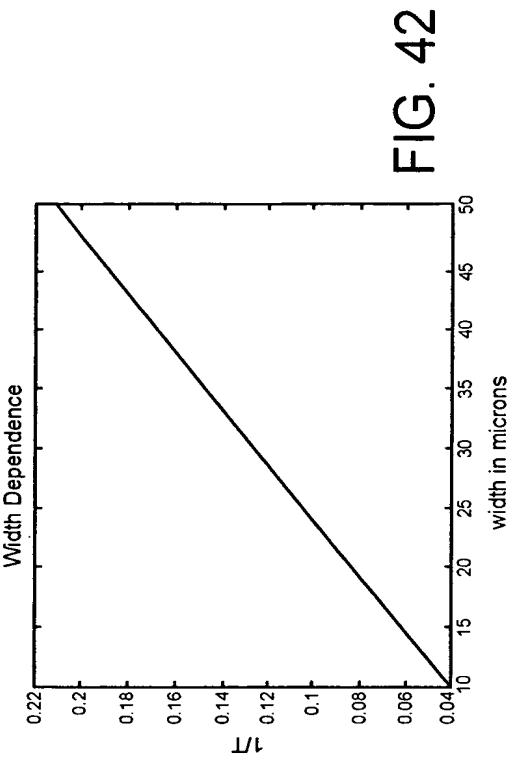


FIG. 42

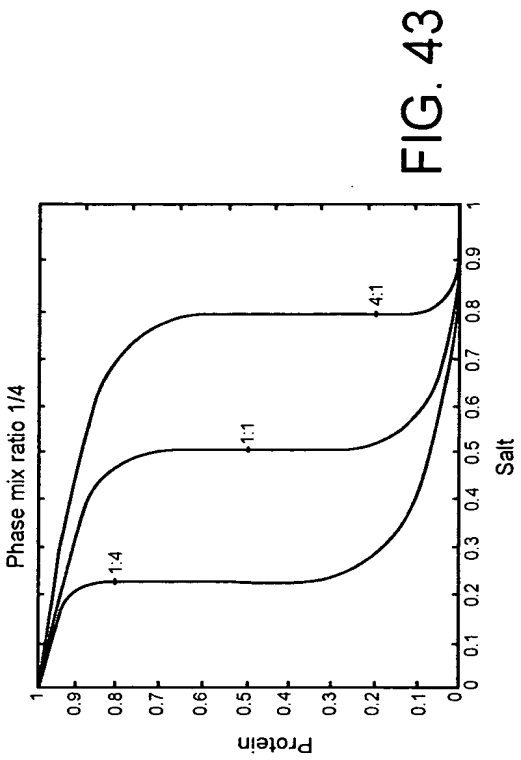


FIG. 43

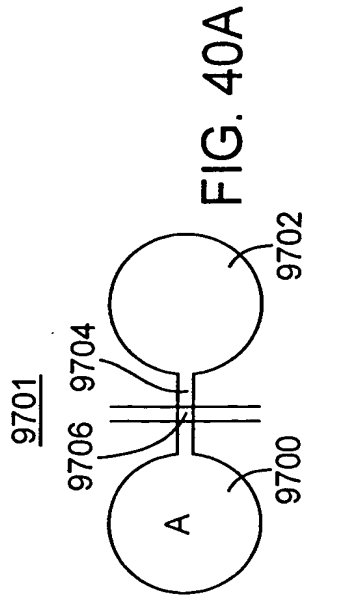


FIG. 40A

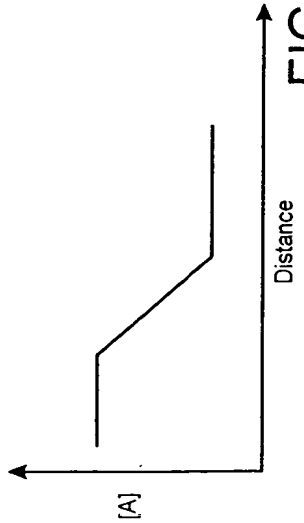


FIG. 40B

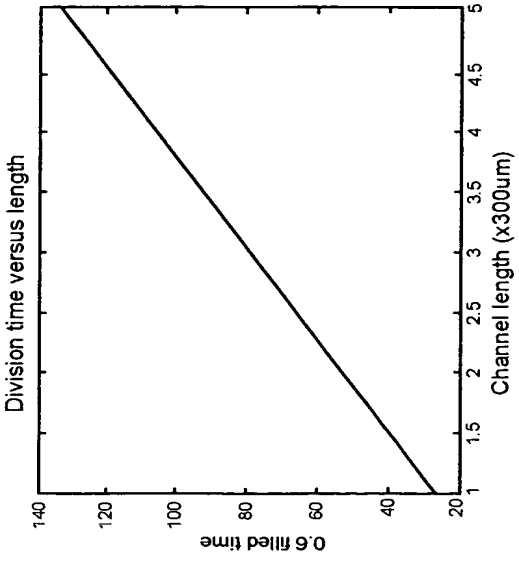


FIG. 41

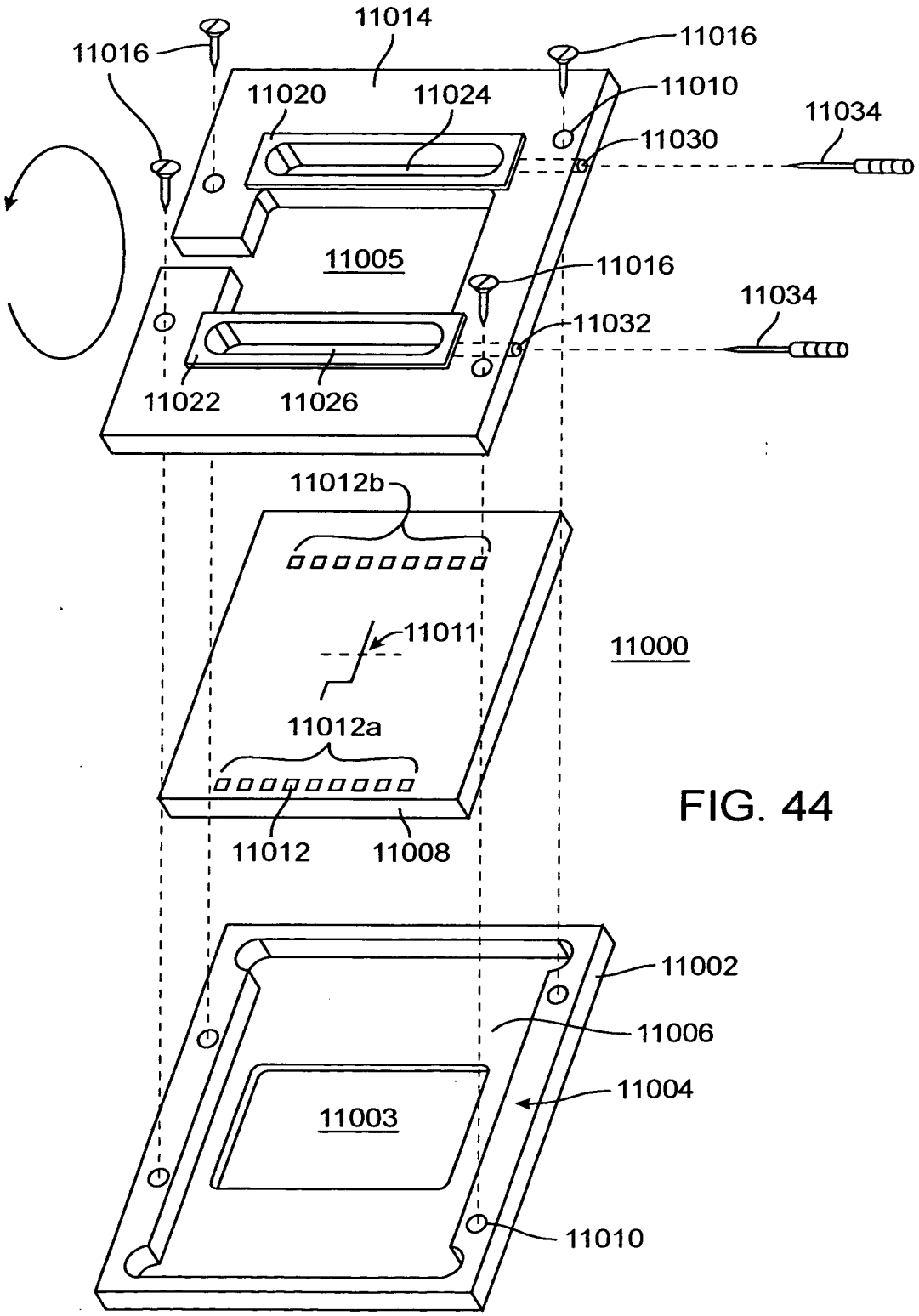

11014
11016
11016
11020
11024
11010
11034
11030
11005
11016
11034
11032
11022
11026
11012b
11011
11000
11012a
11012
11008
11002
11006
11004
11003
11010

FIG. 44

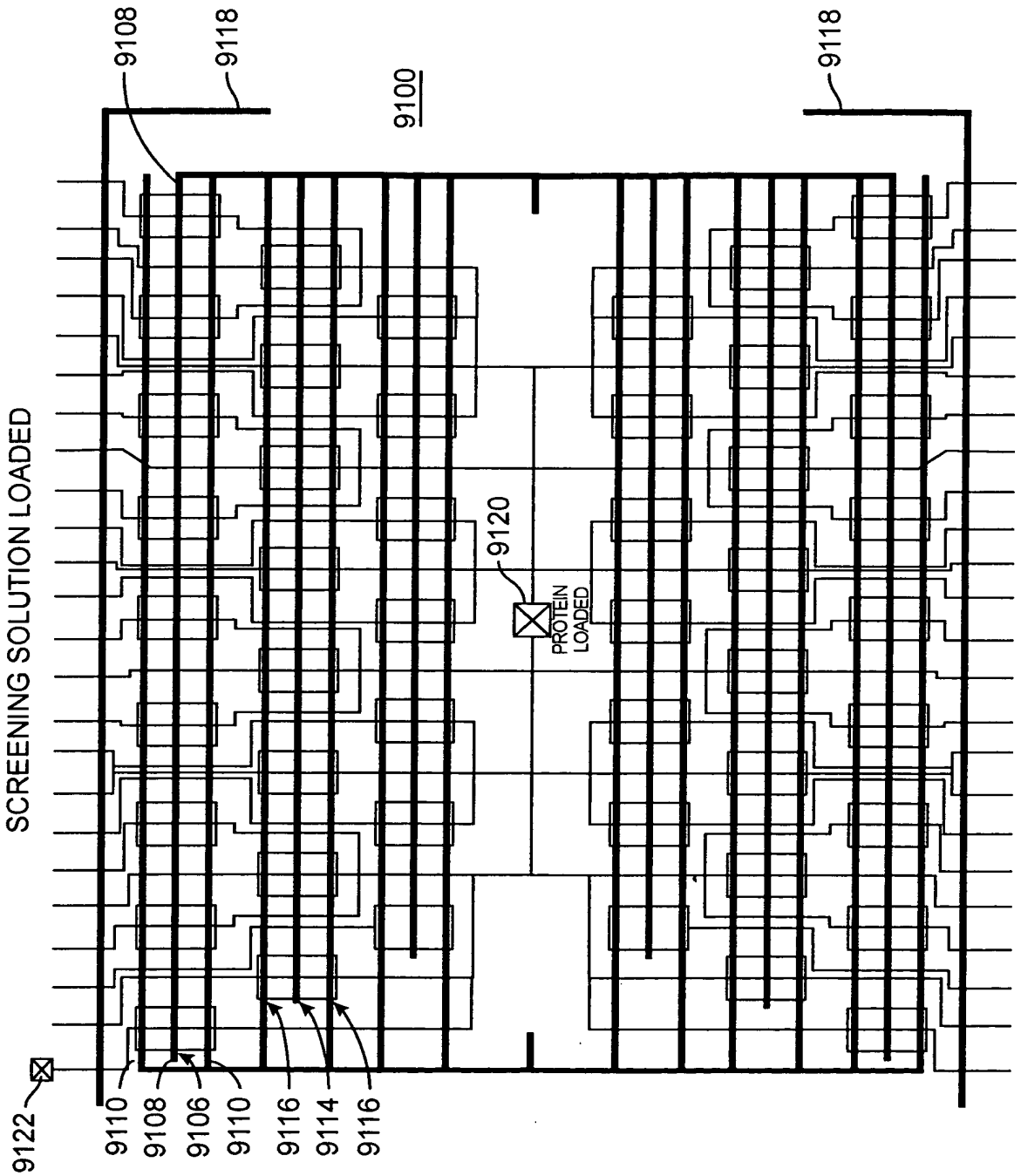

9108
9118
9100
9118
SCREENING SOLUTION LOADED
9120
PROTEIN LOADED
SCREENING SOLUTION LOADED
9122
9110
9108
9106
9110
9116
9114
9116

FIG. 45A

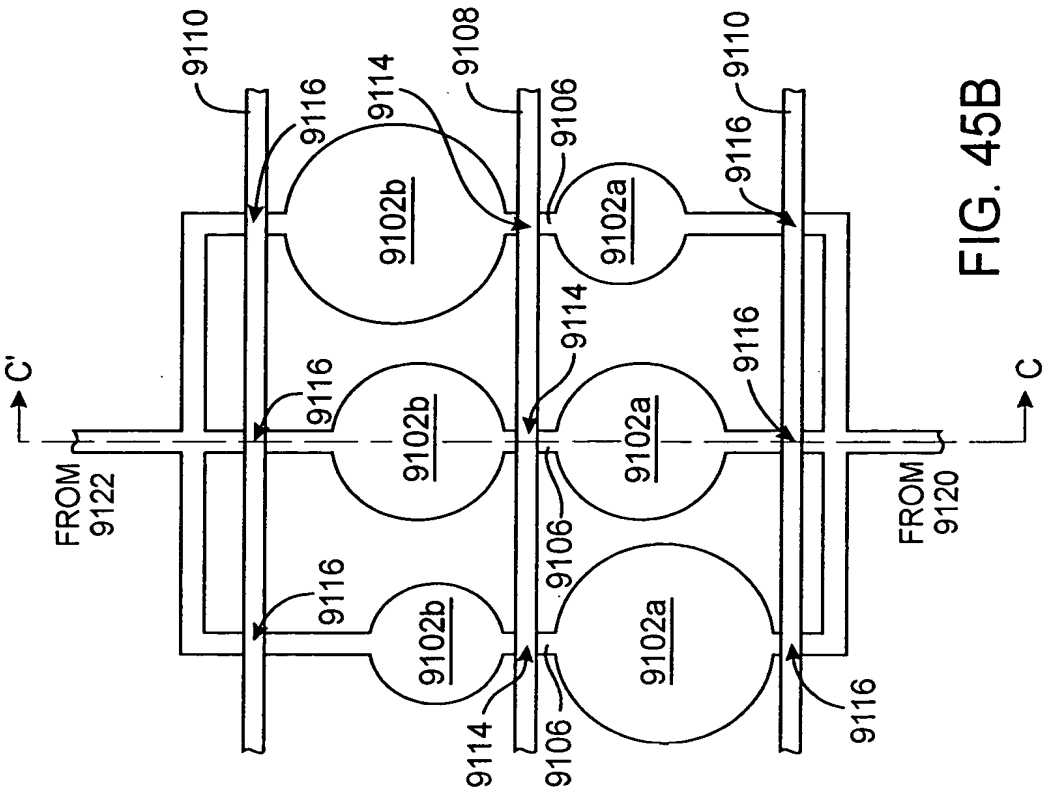


FIG. 45B

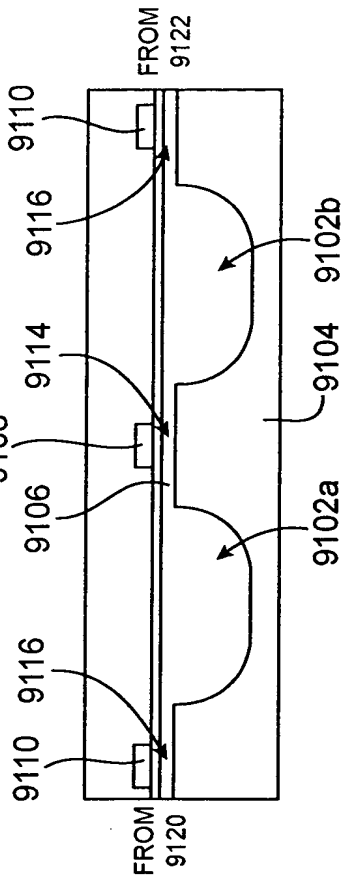


FIG. 45C

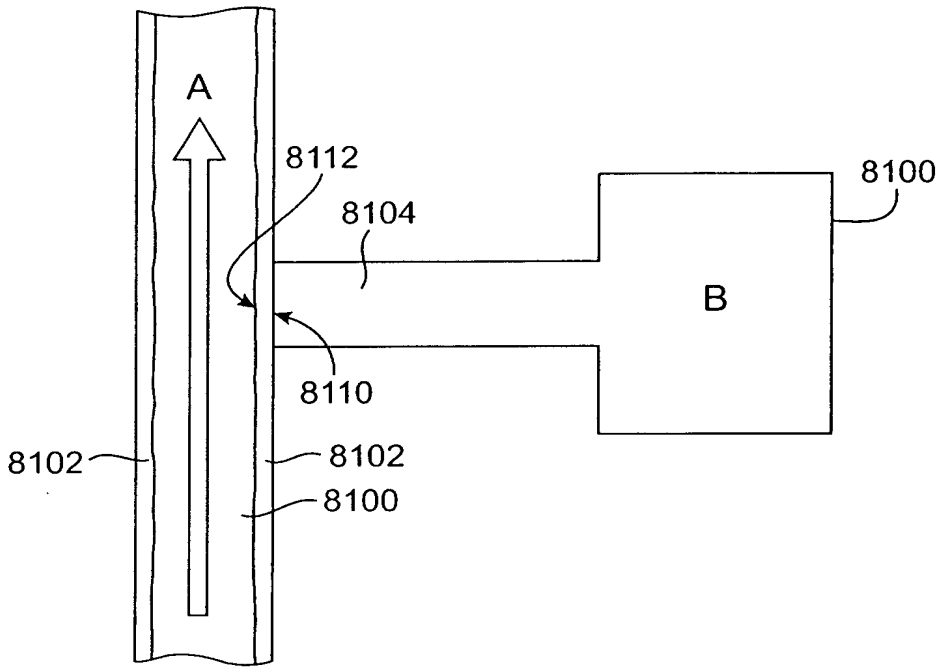


FIG. 46

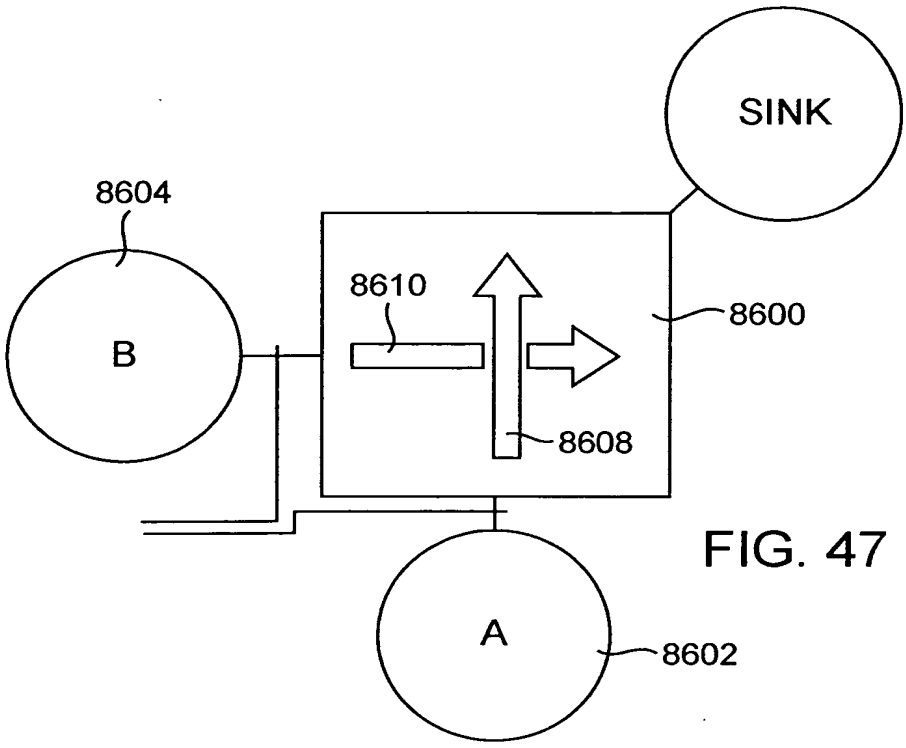

SINK
8604
8610
8600
B
8608
A
8602

FIG. 47

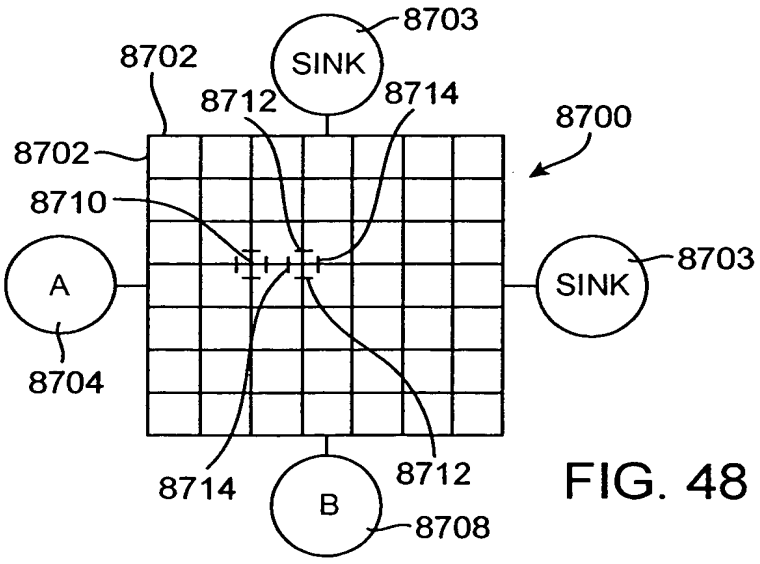
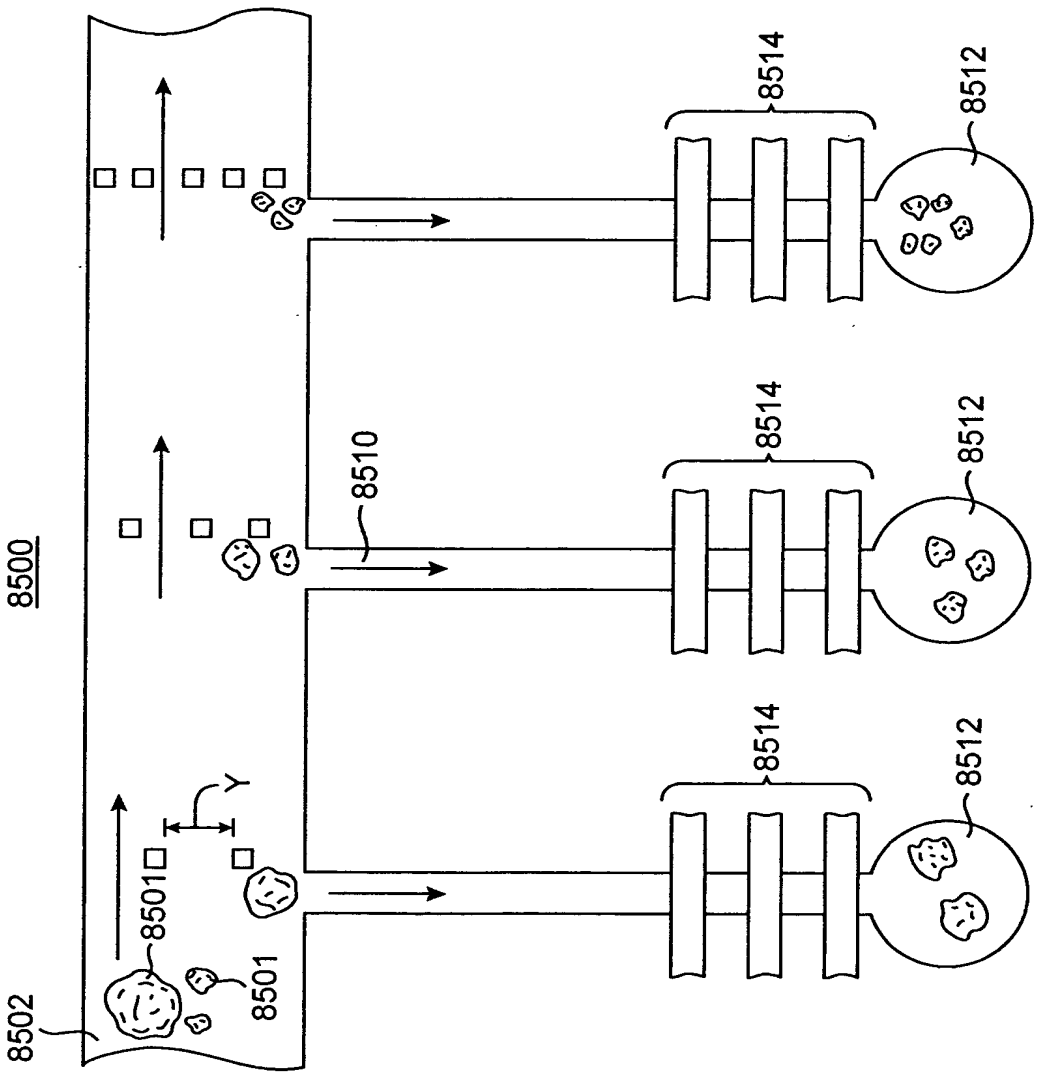

8703
8702
SINK
8712
8714
8700
8702
8710
A
SINK
8703
8704
8714
8712
B
8708

FIG. 48

FIG. 49



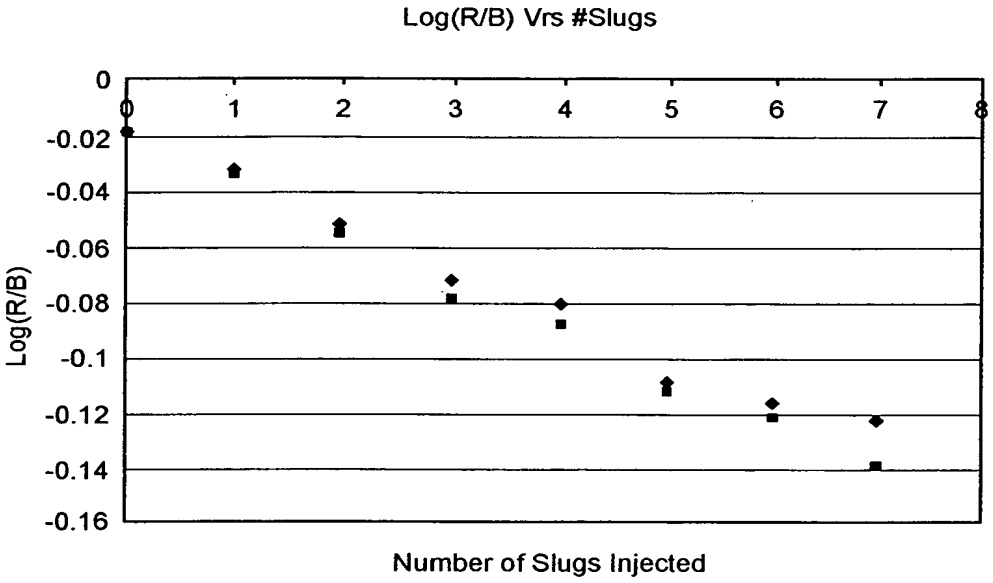

Log(R/B) Vrs #Slugs
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
-0.14
-0.16
Log(R/B)
0
1
2
3
4
5
6
7
8
Number of Slugs Injected

FIG. 50

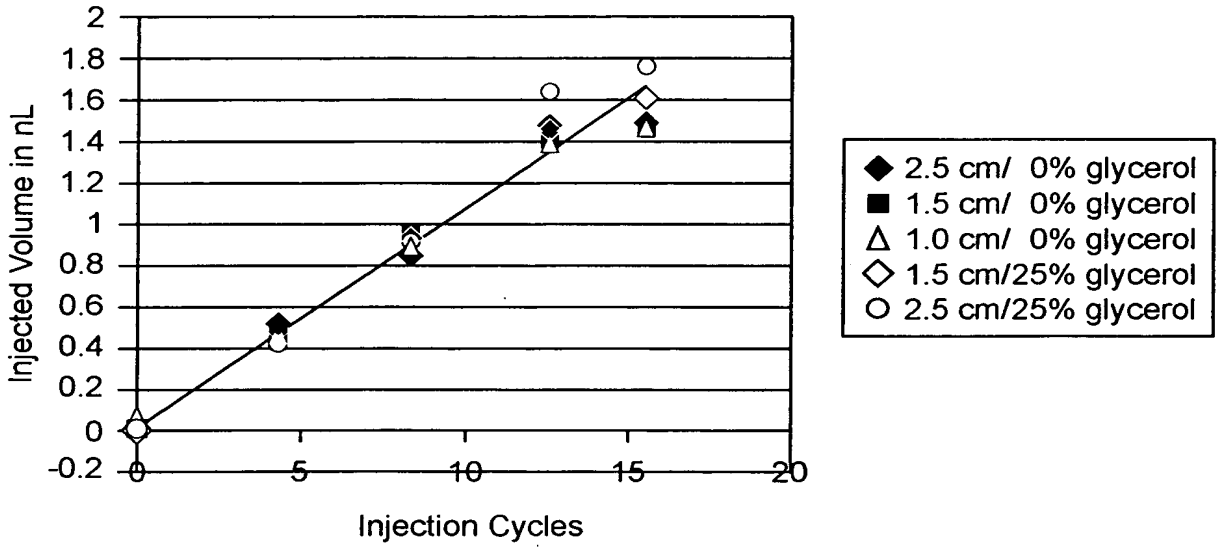

Injected Volume in nL
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
0
5
10
15
20
Injection Cycles
2.5 cm/ 0% glycerol
1.5 cm/ 0% glycerol
1.0 cm/ 0% glycerol
1.5 cm/25% glycerol
2.5 cm/25% glycerol

FIG. 51

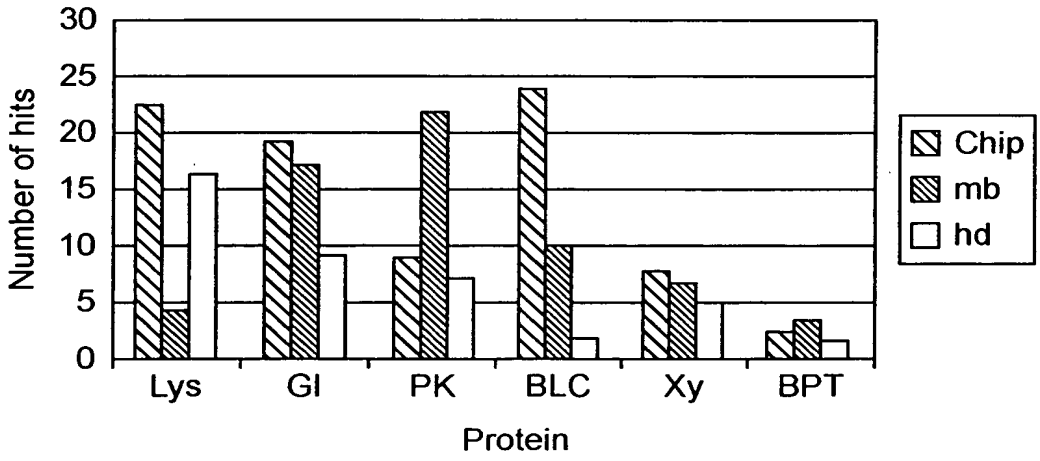

Number of hits
30
25
20
15
10
5
0
Lys
GI
PK
BLC
Xy
BPT
Protein
Chip
mb
hd

FIG. 52

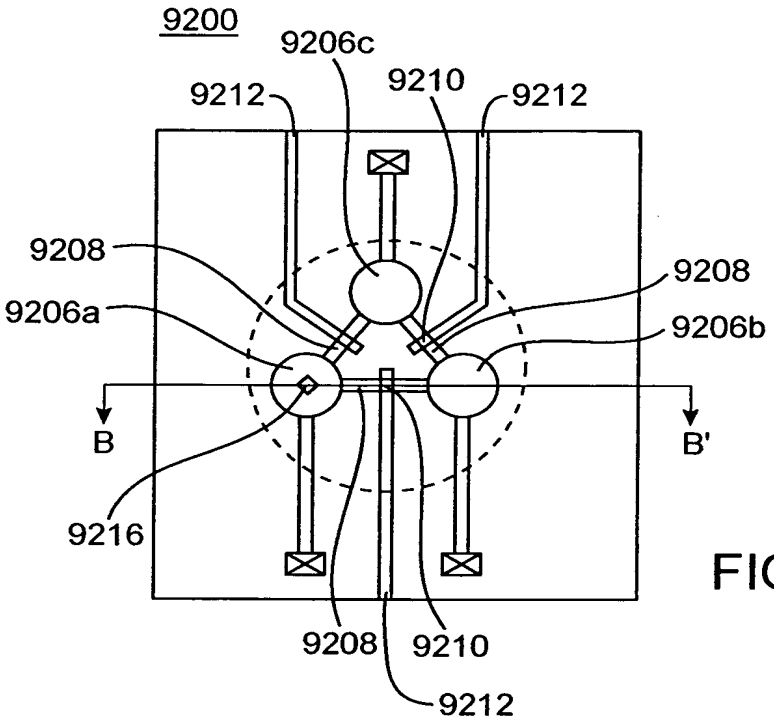


FIG. 53A

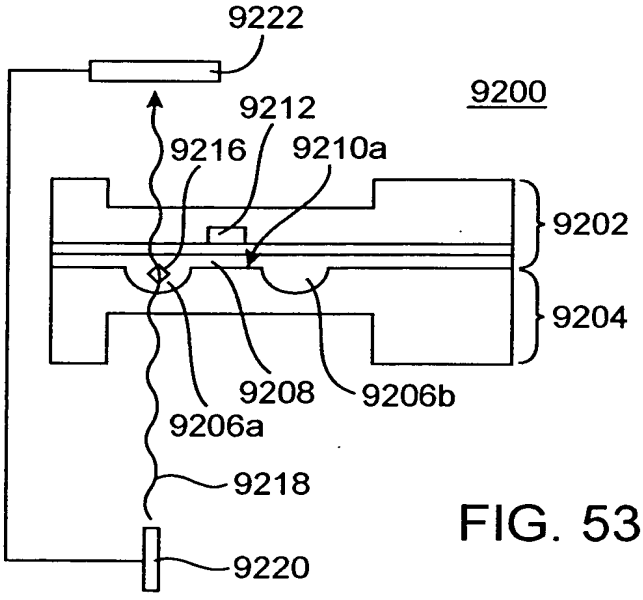


FIG. 53B

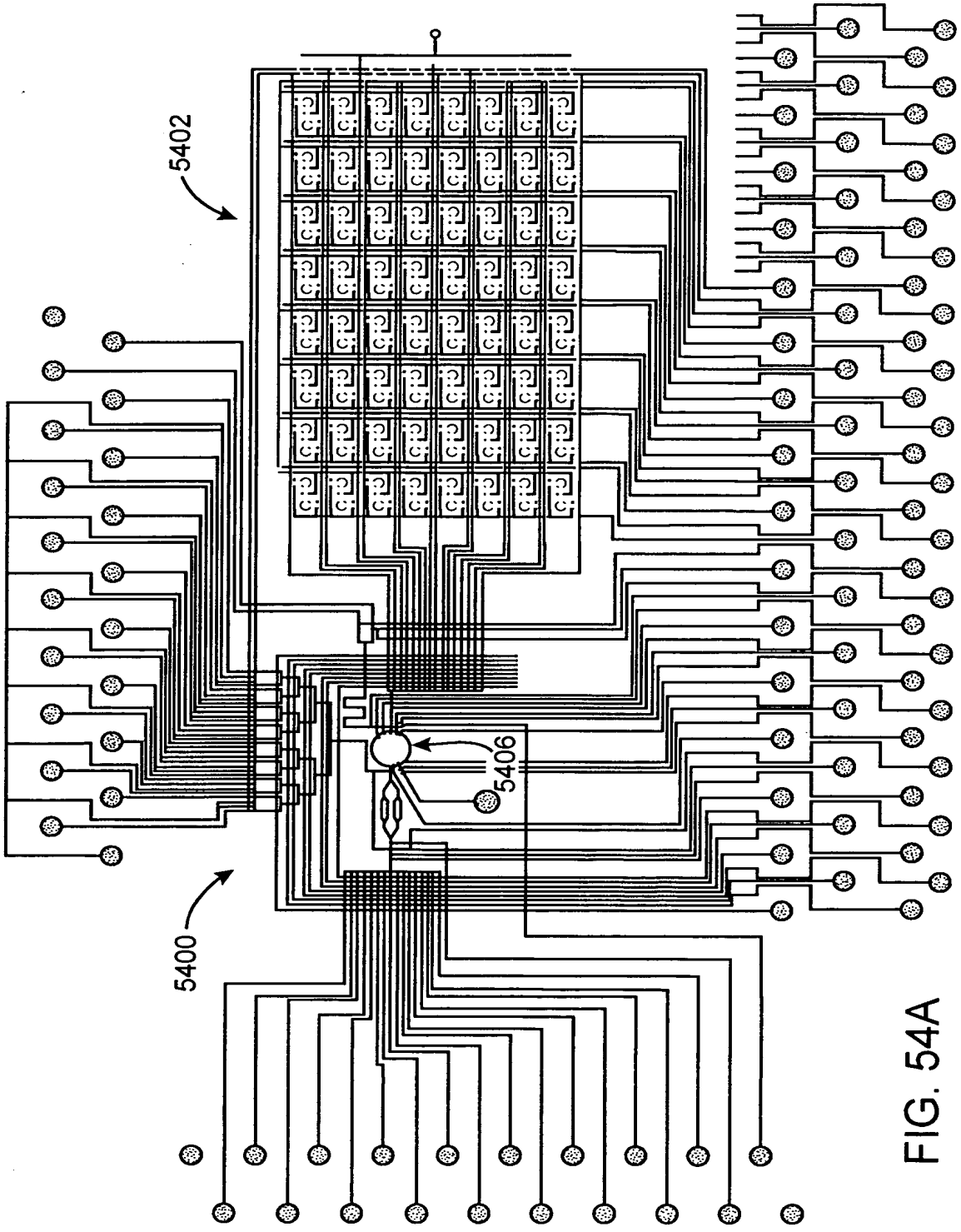
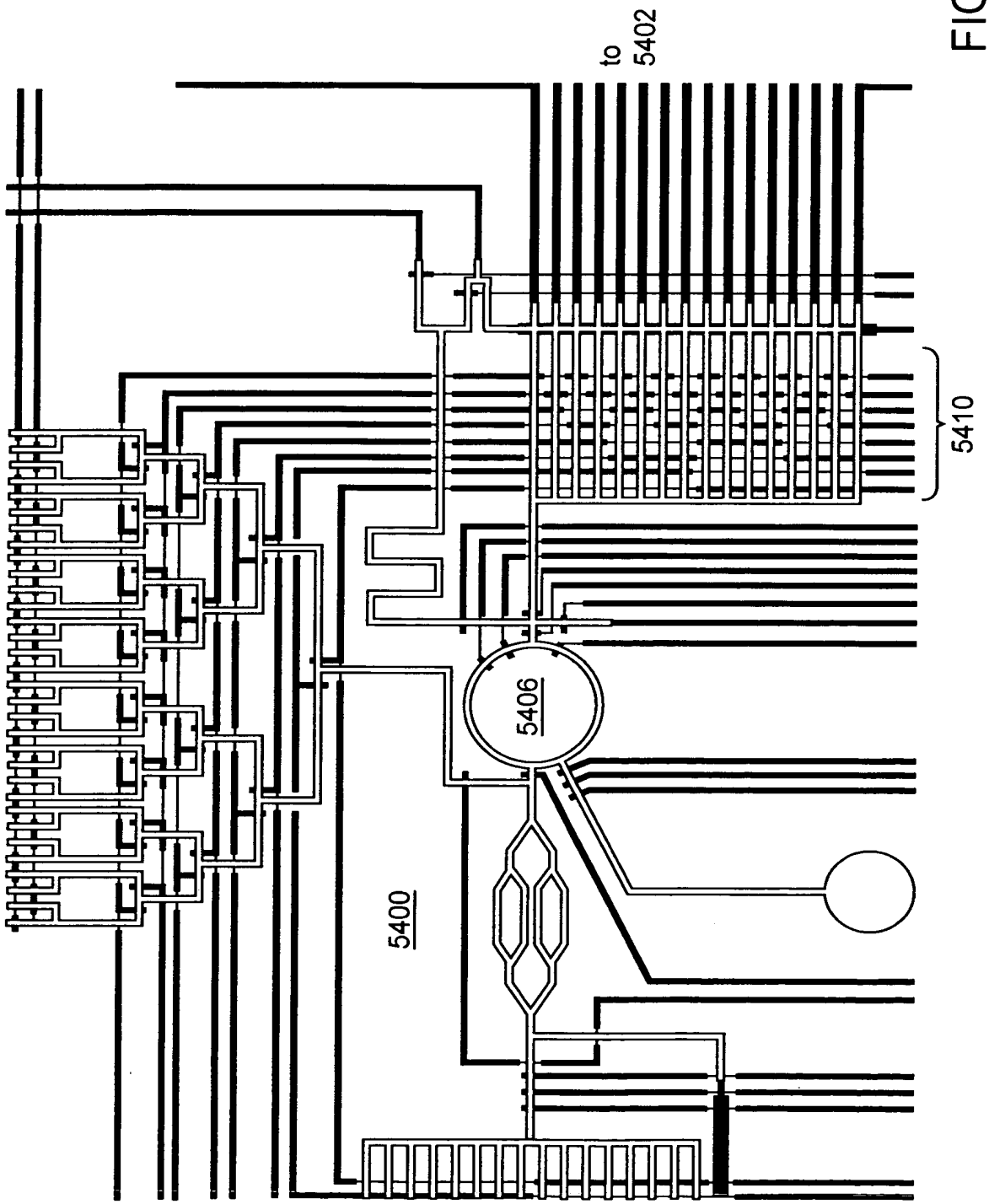


FIG. 54A

FIG. 54B



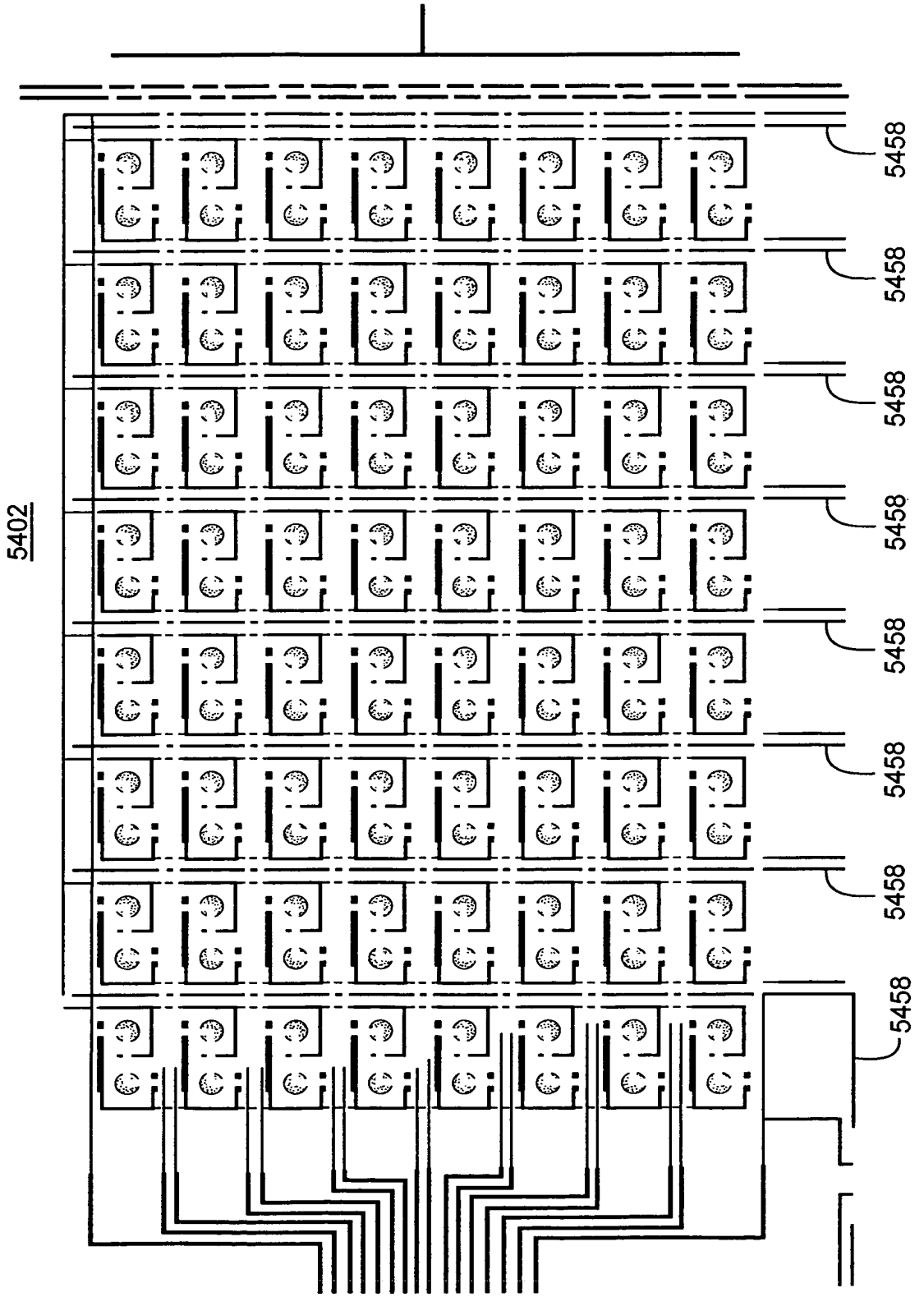


FIG. 54C

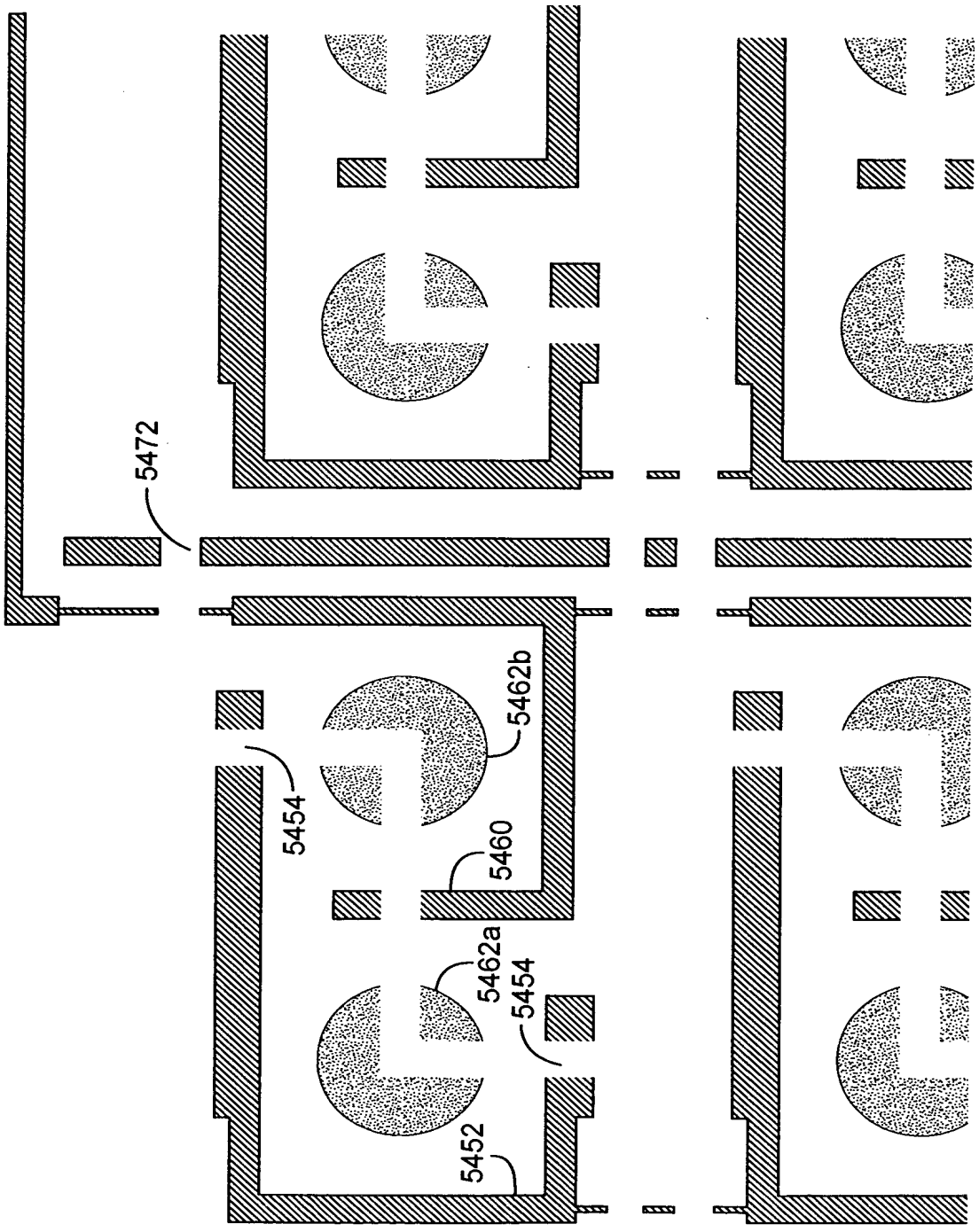


FIG. 54D

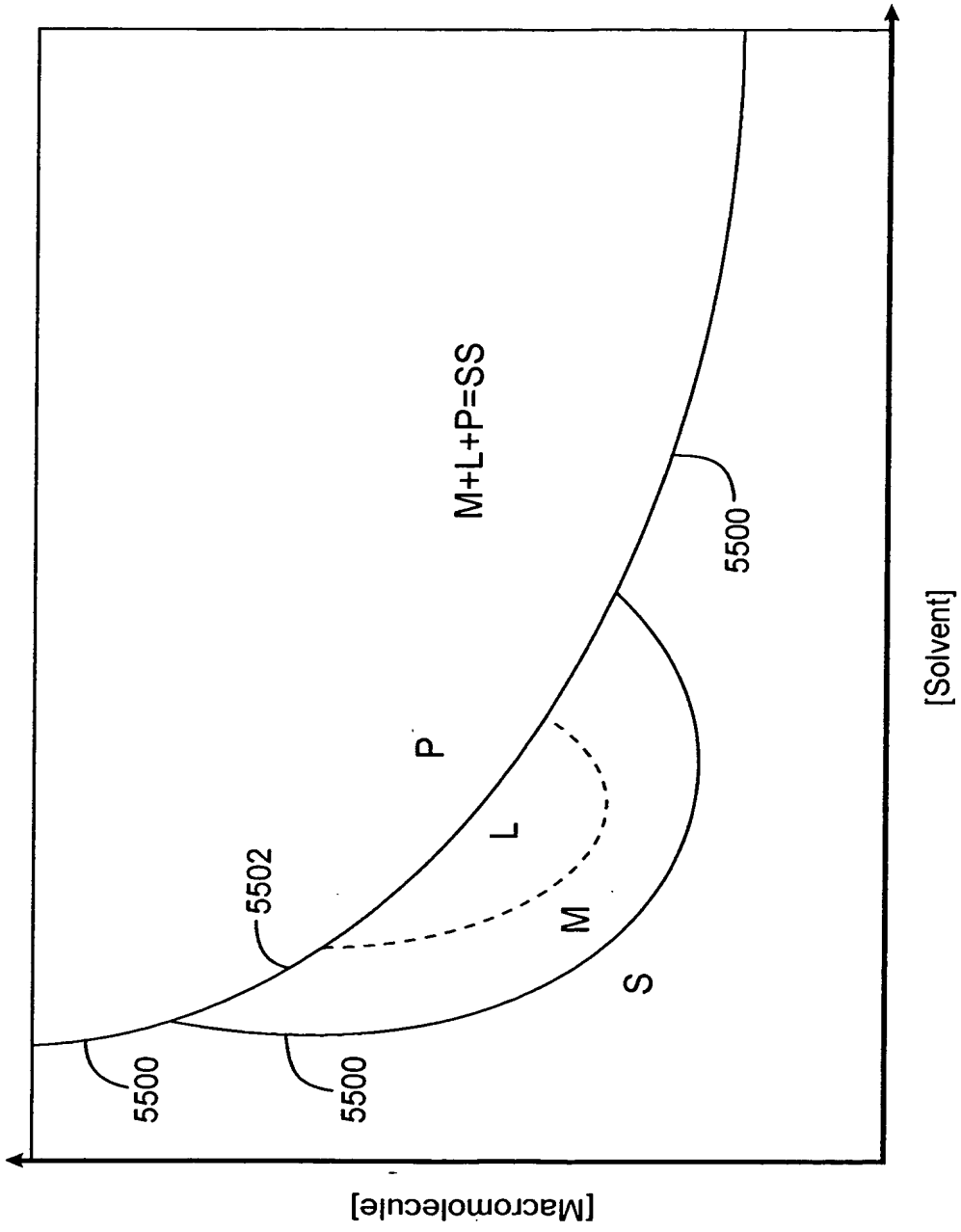


FIG. 55

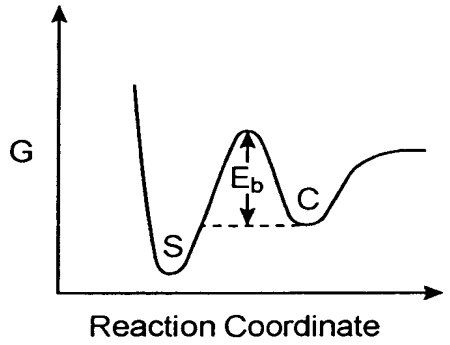


FIG. 56A

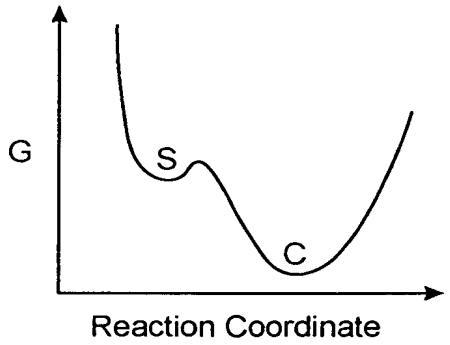


FIG. 56D

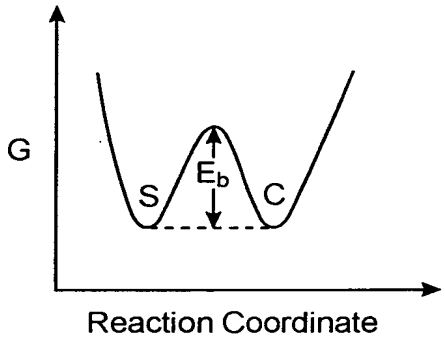


FIG. 56B

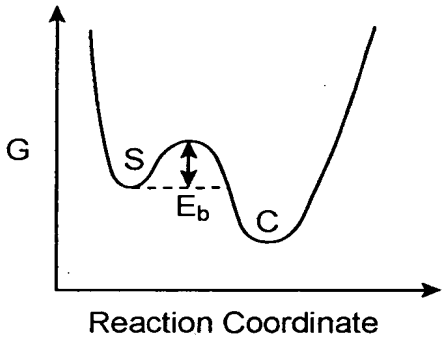


FIG. 56E

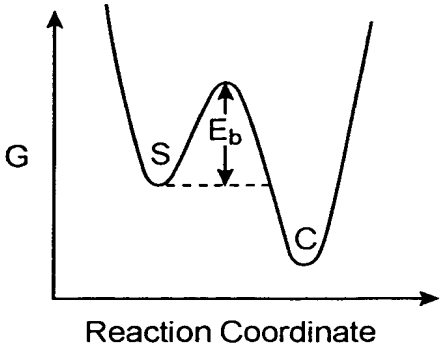


FIG. 56C

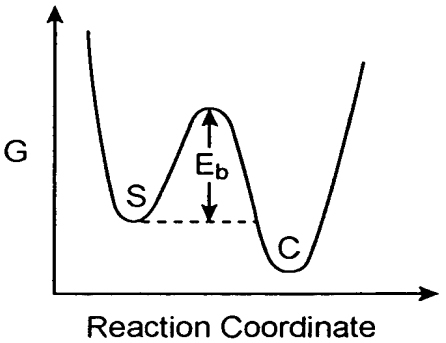


FIG. 56F

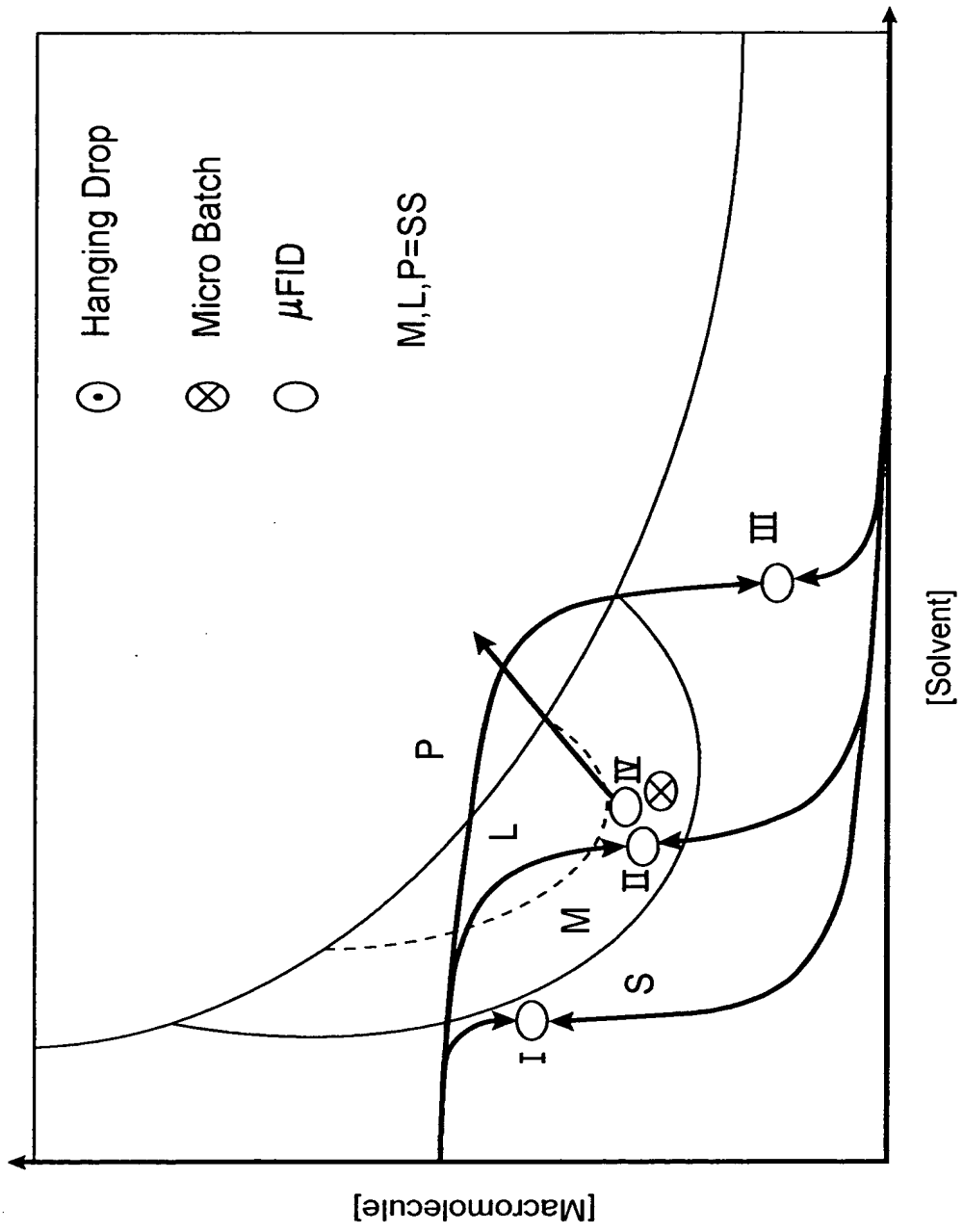

Hanging Drop
Micro Batch
μFID
M,L,P=SS
P
L
M
S
I
II
III
IV
[Solvent]
[Macromolecule]

FIG. 57

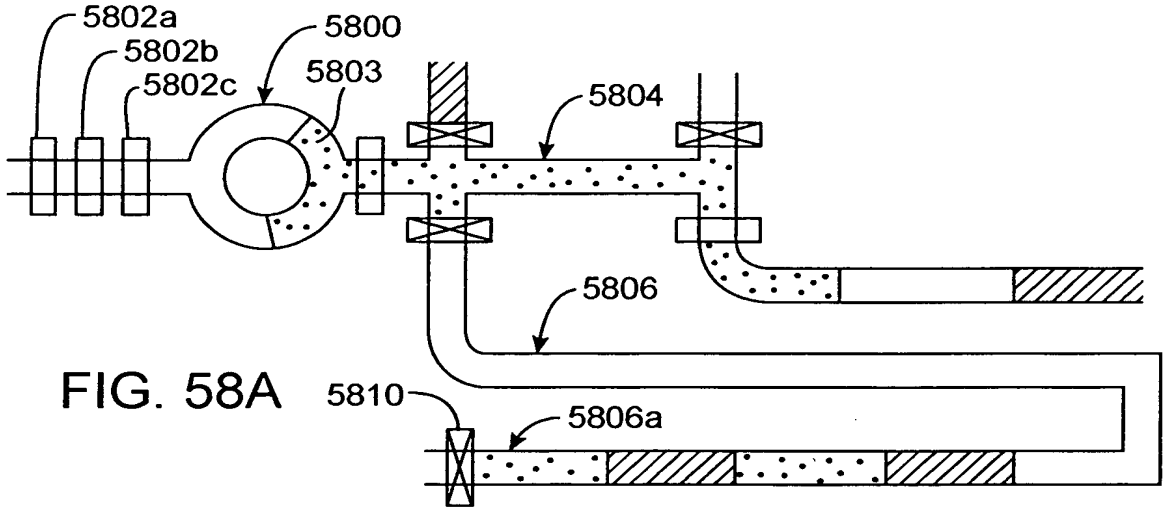


FIG. 58A

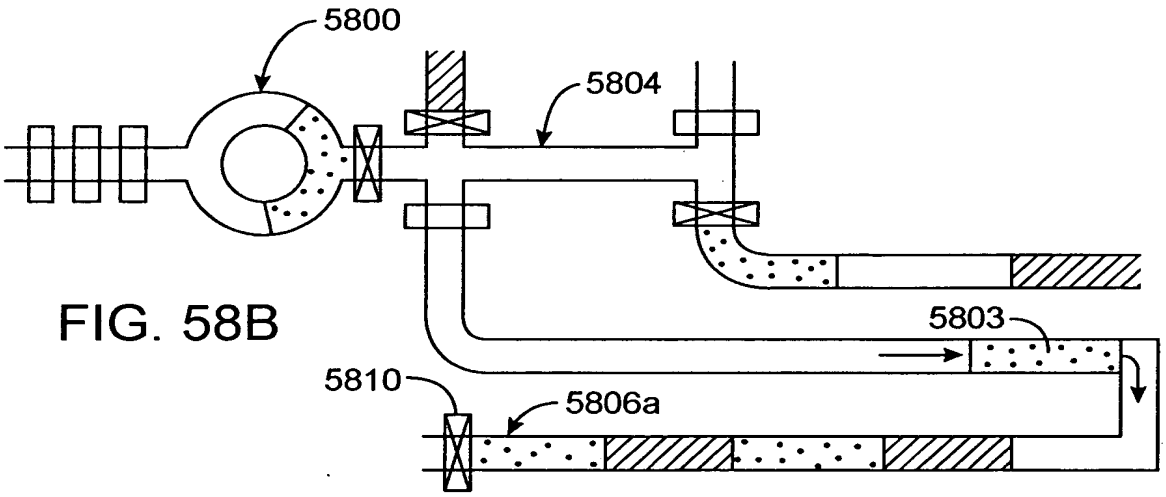


FIG. 58B

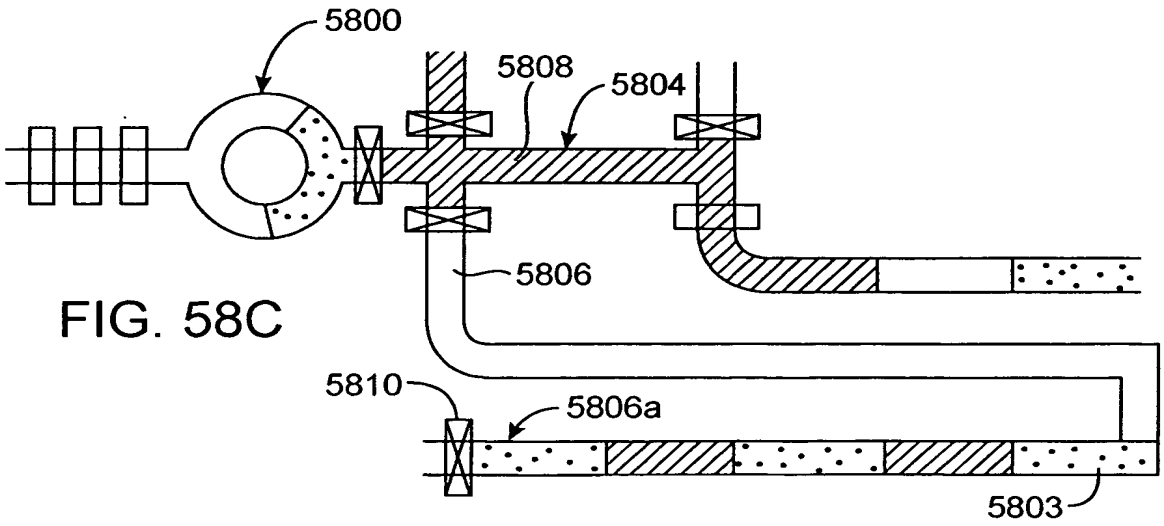


FIG. 58C

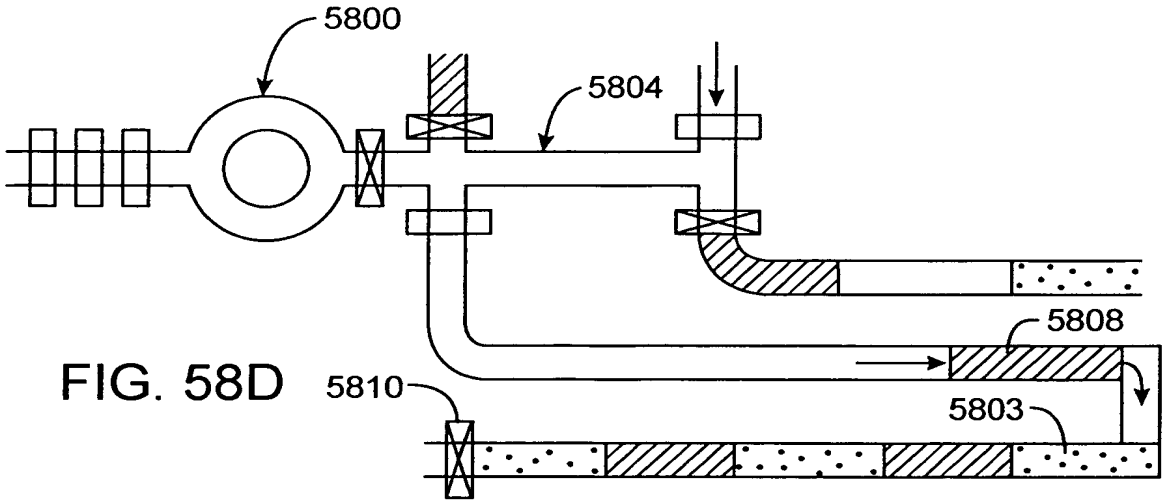


FIG. 58D

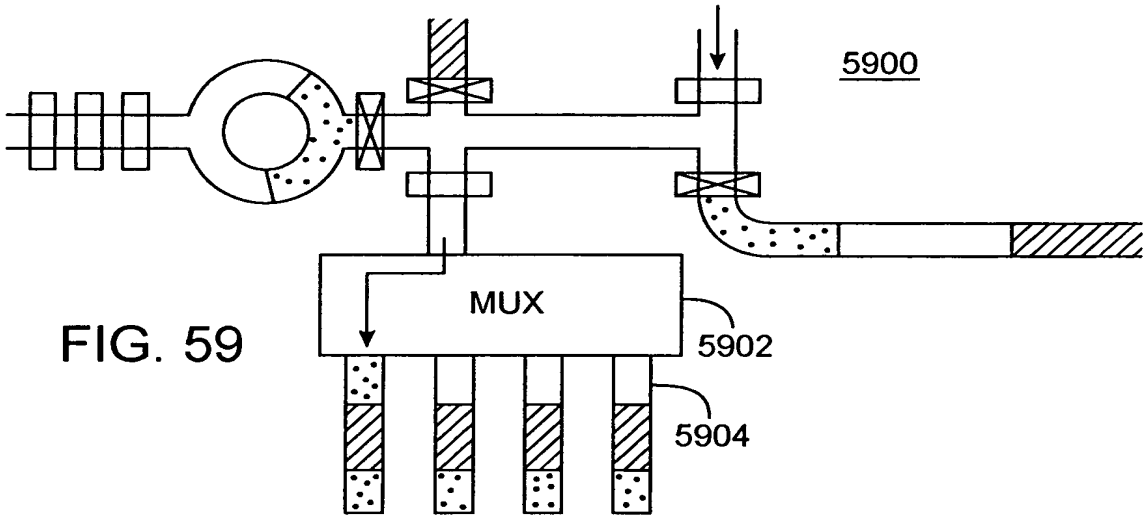


FIG. 59

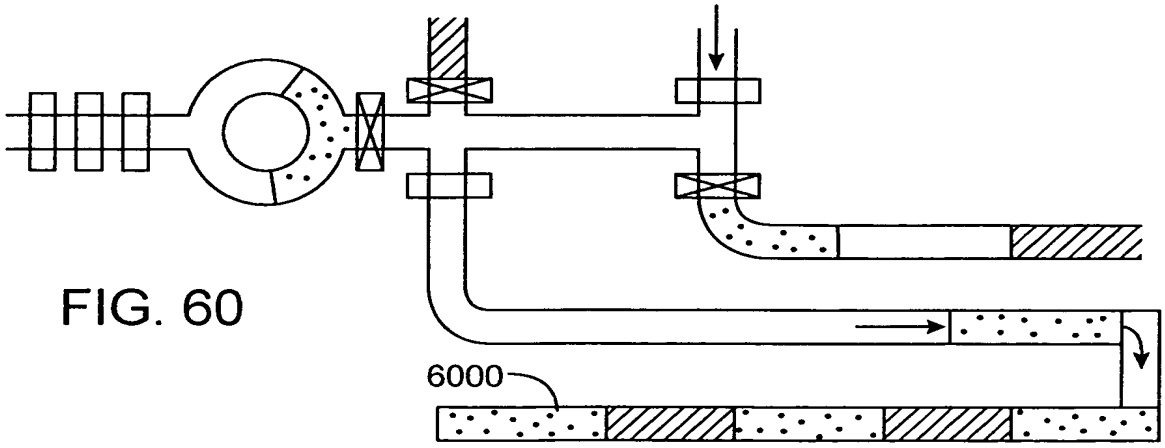


FIG. 60

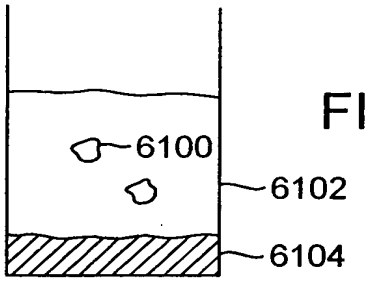


FIG. 61A

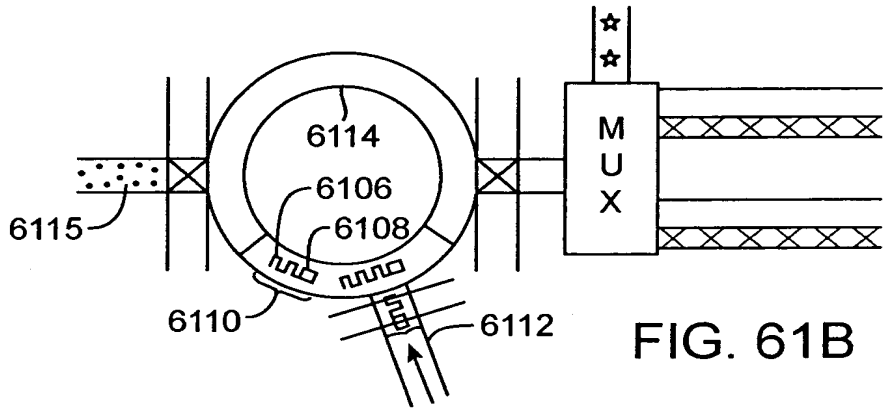


FIG. 61B

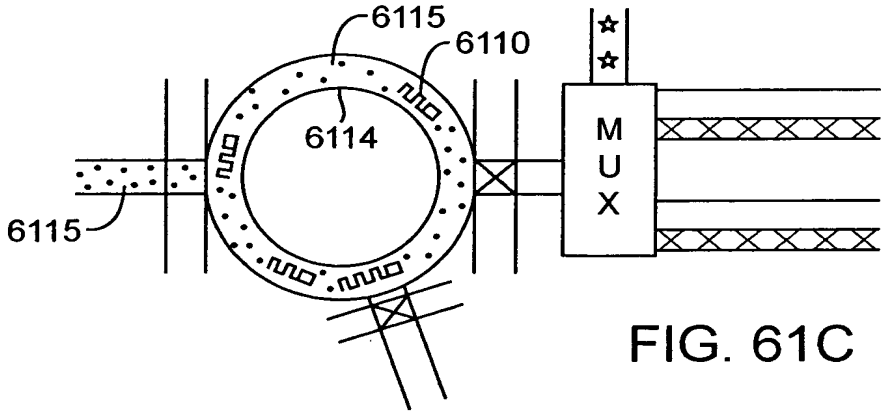


FIG. 61C

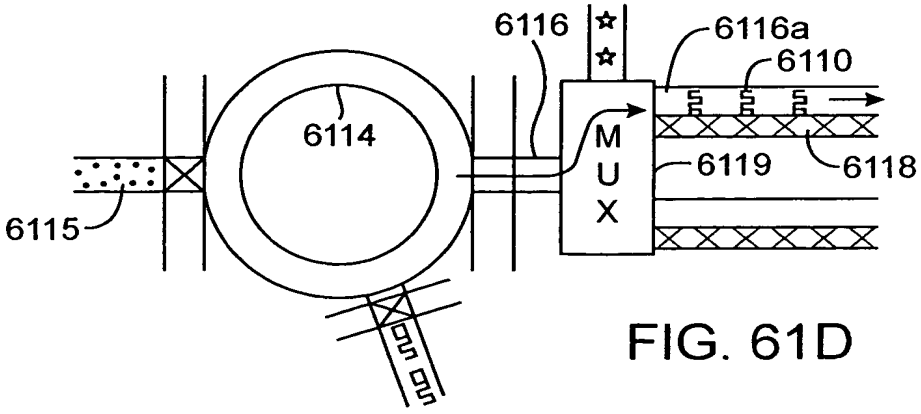


FIG. 61D

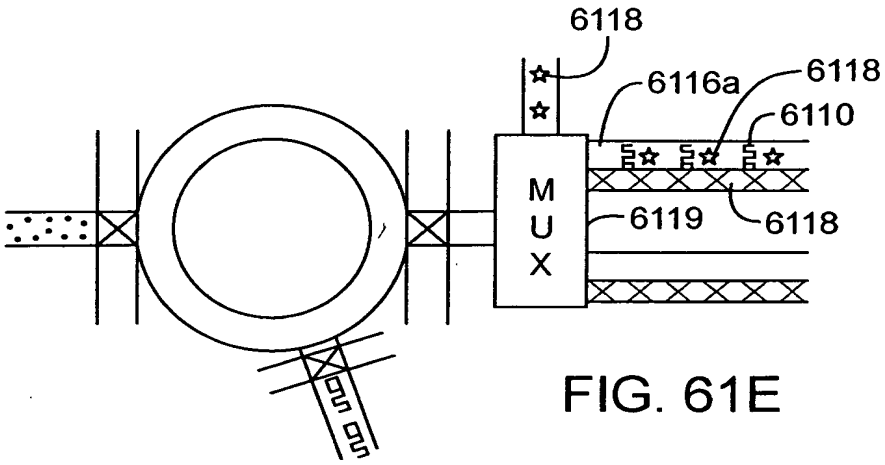


FIG. 61E

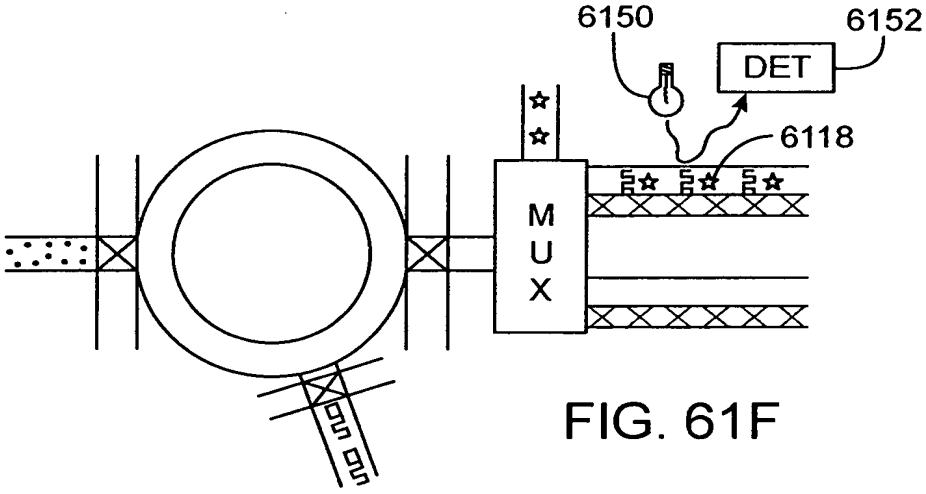


FIG. 61F

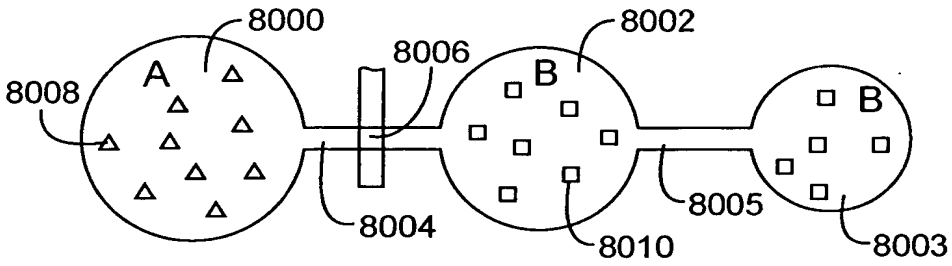


FIG. 62A

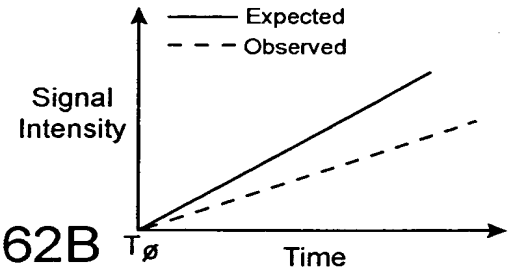


FIG. 62B

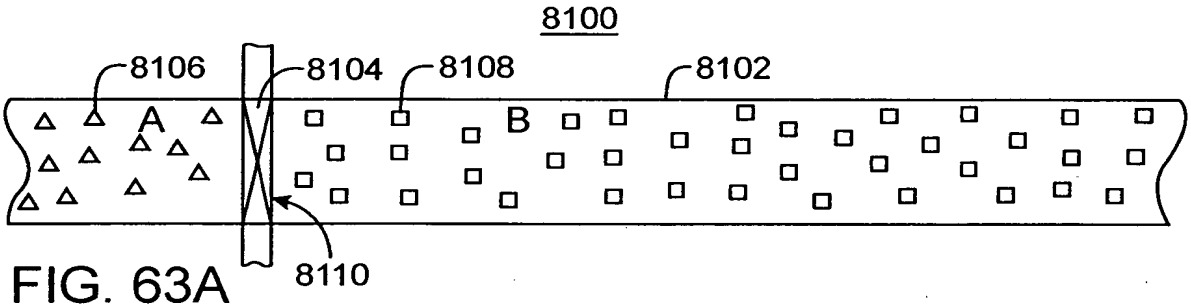


FIG. 63A

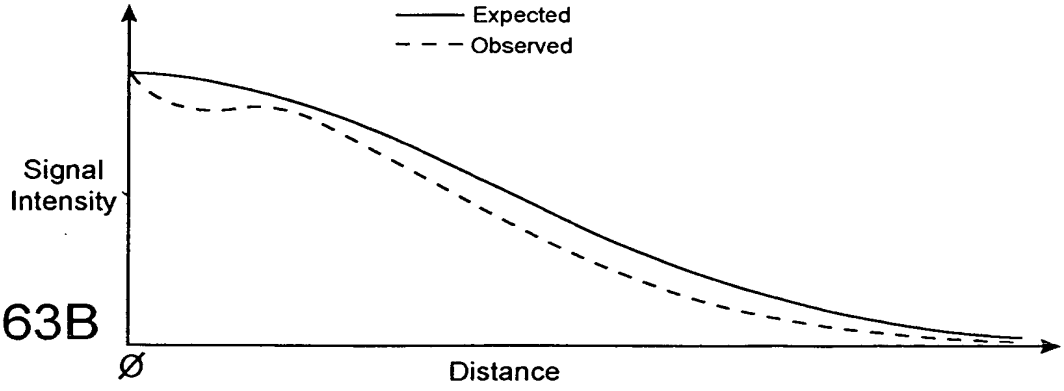


FIG. 63B

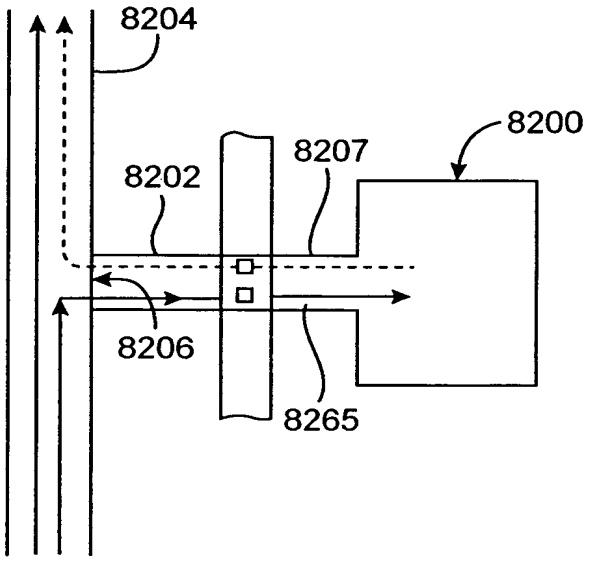


FIG. 64

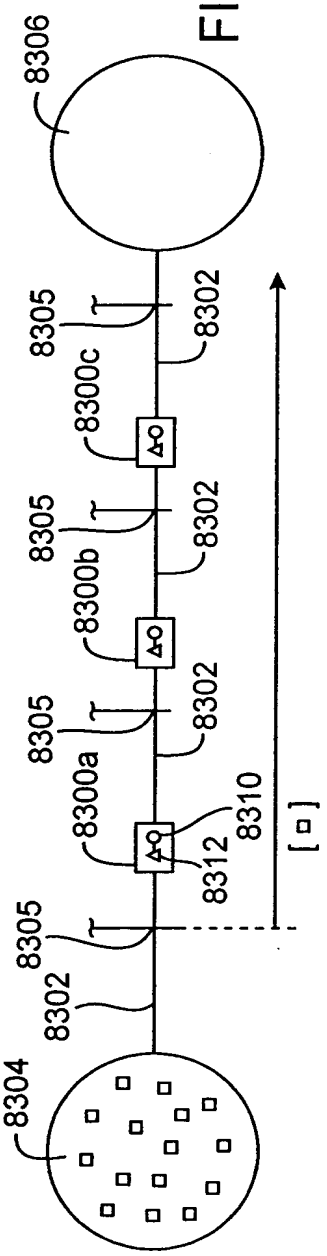


FIG. 65

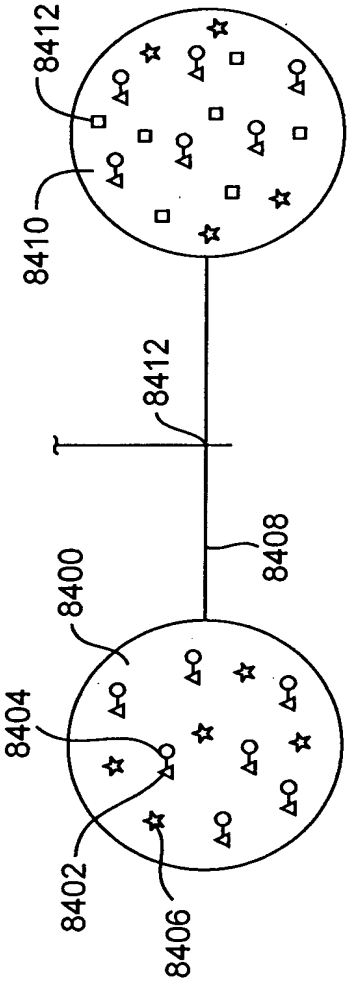


FIG. 66

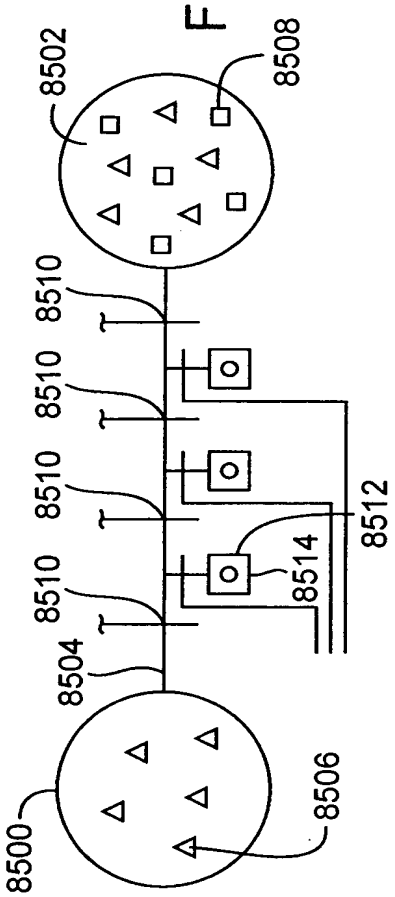


FIG. 67